

CONDITIONS FOR COMMUNITY-BASED ADAPTATION APPROACHES TO CLIMATE CHANGE

MULTIPLE CASE STUDY IN THE NETHERLANDS ABOUT CONDITIONS THAT SUPPORT COMMUNITY RESILIENCE THROUGH CO-CREATION



Conditions for community-based adaptation to climate change: Multiple case study in the Netherlands about conditions that support community resilience through co-creation

Master Thesis

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Preface

In front of you lies the thesis: “Conditions for community-based adaptation to climate change: Multiple case study in the Netherlands about conditions that support community resilience through co-creation”. This thesis was written as part of my master programme Environmental and Infrastructure Planning. The research was conducted from May 2020 to March 2021. I would like to thank my supervisor prof. dr. L.G. Horlings, who guided me through writing this thesis and helped with providing constructive feedback. Furthermore, I would like to thank the participants that responded to my invitation for an interview for their time, effort and knowledge. Lastly, I would like to thank my family, friends, and fellow students who supported me throughout this process.

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Abstract

Climate change is to some degree inevitable, causing an increased focus in adapting to climate change impacts. Because communities are vulnerable to the consequences of climate change, it is important to research how communities can effectively adapt to these changes. Co-creation between local governments and communities could be part of the solution to effective community-based adaptation projects. This thesis therefore focused on how community-based adaptation and co-creation can help communities in the Netherlands adapting to climate changes. This research aimed to create an overview of which conditions contribute to effective use of community-based adaptation and co-creation in the Netherlands, and how these conditions could be applied in other adaptation projects. This was researched by answering the research question: *“How can community-based adaptation and co-creation support communities in the Netherlands to become more resilient to climate change?”*. The theory showed that forms of capital (social, political, financial) can be used through co-creation processes between local governments and initiatives. Participation, learning, and the use of knowledge (local, expert, creative) in these processes could lead to effective community-based adaptation approaches. These approaches could help with building absorptive, adaptive and transformative capacity. By the use of three case studies in the Netherlands and semi-structured interviews, supporting conditions were tested in practice. It was identified that the size and capacity of local governments influenced both capital and the distribution of roles in the co-creation process. Furthermore, social entrepreneurs are needed for the creation of value. These conditions, together with the conditions derived from the theory, form a basis for capacity building. However, a presence of these conditions does not necessarily mean that communities are resilient because trends in national governments, a communities' perception of urgency, and a compatible role distribution influence the process of resilience creation as well. Recommendations for further research are that more research should be conducted on transformative capacity and how it can be gathered in practice by studying cases which focus on transformative capacity building.

Key words: community-based adaptation, co-creation, resilience, civic initiatives, climate adaptation, capacity building, capital, learning and knowledge, participation.

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Abbreviations

CBA	Community-based adaptation
KNNV	Koninklijke Nederlandse Natuurhistorische Vereniging
IVN	Instituut voor natuureducatie en duurzaamheid
KANT	Klimaat Adaptieve Natuur en Tuinen
IAP2	International Association for Public Participation

1. Introduction

1.1. Background

Climate change is caused by greenhouse emissions on a global level, which could be solved by mitigating the emission. In the Paris Agreement (Broto, 2016) governments agreed to keep emission levels below the amount that leads to 1.5 degrees Celsius increase, but it is highly uncertain if these agreements will be met. Due to the realisations that climate change is to some degree inevitable, there is an increased focus on adapting to the effects of climate change (Blackett et al. 2010). Flooding, droughts, and severe heat waves are the main impacts of climate change in Europe, affecting especially urban and low-lying regions. These vulnerable regions are therefore in need of adaptation measures (EC, 2020, ESPON, 2012).

While emission mitigation should occur on a global scale, adaptation takes place on a local scale and should consist of place-based solutions because different factors (e.g., institutional settings, cultural aspects, financial capacities and spatial factors) create different circumstances per region, with corresponding 'best fit' adaptations required (Kamener et al. 2019). Effective adaptation requires local knowledge, which is accessible through communities and helps with understanding local contexts and vulnerabilities (McNamara & Buggy, 2017). Communities are vulnerable to climate change impacts, and thus have a large benefit of becoming more resilient and adapt to changing circumstances (Dumaru, 2010).

The impacts of climate change have an effect at the local level, which implies a need for local resilience. Communities could use technical solutions to adapt, but these may not be in reach due to their expense. Social approaches to adapt to climate change are emerging and could be helpful, since local knowledge within these communities is present. One of these approaches is community-based adaptation (CBA), a community-led process based on communities' priorities, needs, knowledge, and capacities. CBA empowers people to plan for and cope with the impacts of climate change (Reid et al. 2009). To optimise the effectiveness of these initiatives it is important to research how they can adapt to these changes

In the Netherlands, governments play a vital role in adaptation plans. Citizen engagement by governments is growing in decision making processes related to the built environment (Davis & Andrew, 2017), and citizens are increasingly invited to design along in value creation processes (Voorberg et al. 2014). The Dutch king referred in the 2013 king's speech to a shift from the welfare state to a participatory society, which meant that citizens should not be dependent on the government for their wellbeing, but rather encouraged to take responsibility for this themselves (Tweede Kamer, 2014). The introduction of a new law, the so-called Environment and Planning Act (*Omgevingswet*), which bundles the current regulations with regard to spatial and environmental planning, and aims to steer local governments towards active participation with citizens, aligns with the view of the need for active involvement of citizens in the planning process.

Therefore, not only a CBA, but also co-creation between local governments, communities, and other stakeholders could be a tool for adaptation projects. In co-creation processes both public and private actors work together to solve a shared problem or challenge by sharing knowledge, resources, and ideas that stimulate the production of public value (Voorberg et al. 2015). This collaboration process improves and stimulates innovative outcomes that change the understanding of the problem and lead to new solutions (Torfing et al. 2016).

Combining co-creation and CBA could imply a comprehensive approach for climate adaptation projects. CBA links climate adaptation with other priorities in communities which could help with creating awareness for multiple problems and activates citizens to help. By collaborating with relevant actors, useful resources (e.g., finances, social networks, knowledge) for communities can be pooled and used for value creation. This way, spatial interventions concerning climate adaptation are combined with local interests of relevant actors. This thesis will therefore focus on how community-based adaptation and co-creation can help communities in the Netherlands adapting to climate changes by comparing multiple case studies.

1.2. Research aim

This research aims to create an overview of conditions which contribute to effective use of CBA and co-creation in the Netherlands, and how these approaches could be applied to other climate adaptation projects. This is important for communities which are specifically vulnerable to climate change (Dolan & Walker, 2006). By the use of three case studies in the Netherlands, as well as literature research and interviews, the following research question is answered:

“How can community-based adaptation and co-creation support communities in the Netherlands to become more resilient to climate change?”

The following sub questions help to answer this research question:

1. What conditions contribute to effective community-based adaptation and co-creation, thus supporting community resilience to climate change?
2. What role distribution between local governments and communities in co-creation processes contributes to the creation of resilient communities?
3. How do civic initiatives in the Netherlands implement community-based adaptation approaches to creating resilience?
4. How can the lessons learnt be applied in other contexts?

1.3. Research outcome

By answering these questions, it should become clear how CBA and co-creation can support communities with adapting to climate change impacts. By identifying factors that contribute to the effective use of these concepts and subsequently operationalising them for other place-based contexts, local projects and communities could benefit. To do so, different concepts and conditions need to be explained. First, it is necessary to define the relationship between resilience and adaptation. Secondly, CBA needs to be further explained. A major factor of CBA is the institutional setting, which can vary by country and even community. Therefore, factors that are influenced by institutional settings need to be taken into account in order to create a basis for application of CBA. Through the use of three case studies, the conditions that support community adaptation and co-creation are explored. This overview is useful for planning practice because it could be used as a basis for other projects.

1.4. Scientific relevance

As the effects of climate change make an impact at the local level, it is important for communities to adapt to these changes to be resilient (Reid et al. 2009). Researchers need to shift away from examining the nature of resilience and instead accelerate learning about fostering resilience in practice (Fazey et al. 2018). Thus, there is a need for approaches and strategies that help communities to adapt, one of which is CBA. As Reid et al. (2009) point out, it is unlikely that interventions focusing exclusively on climate-related risks will reflect community priorities. Effective adaptation projects therefore should focus not only on adaptation, but also on other key issues in the communities. Community-based adaptation is a community-led process based on communities' priorities, needs, knowledge, and capacities which empowers people to plan for and cope with the impacts of climate change (Reid et al. 2009). It aims to help communities adapt and thus become resilient while also addressing other priorities of the community. Adaptation strategies in CBA must be generated through participatory processes involving local stakeholders, rather than solely through scientific inputs (Ayers & Forsyth, 2009). Rawlani and Sovacool (2011) point out that although many people promote the use of CBA, academic literature on the topic is limited and poorly informed by theory or evidence; therefore, additional research on this topic is needed. Furthermore, it is difficult to apply context-dependent lessons at the local level to other projects in different locations. Therefore, a critical analysis of the conditions which contribute to effective use of CBA is needed (McNamara & Buggy, 2017). Thus, more research must be conducted on how CBA can help communities adapt to climate changes. This corresponds with the aim of this research to create an overview of conditions which contribute to the effective use of CBA and co-creation in the Netherlands.

1.5. Relevance for planning

Climate change poses significant challenges to planning for the future (Simon et al. 2020). Local governments are increasingly involved in planning for climate change adaptation, although the role of public participation in such efforts remains under-studied (Sarzynski, 2015). Although proactive approaches by local governments are gradually increasing, competing priorities, limited resources, and uncertain effects inhibit this progress. Community involvement in the planning process can help local governments with this proactive stance. The Dutch government is trying to include this in current laws by implementing the *Omgevingswet*, which steers local governments to actively participate with other stakeholders. However, it is important that this participation process is not an empty shell. Co-creation between communities and local governments can create intensive involvement in the implementation of adaptation responses and collective resource contribution, which helps both parties to become more resilient (Sarzynski, 2015). Uncertainties about how climate change affects different communities, as well as how and which adaptation measures could be used by these communities are important questions for planning. Researching both CBA and co-creation allows for a better understanding of how communities should be included in the planning process, as well as how these communities could proactively adapt to climate change.

1.6. Reading guide

This thesis consists of seven chapters. Chapter one has introduced the topic of community-based adaptation and co-creation in the Netherlands, and why these approaches are being researched. Chapter two contains the theoretical framework in which conditions of resilience, CBA and co-creation are discussed. Chapter three outlines the used research methods and describes the studied cases, as well as the ethics of this thesis. Chapter four shows the results which were gathered through semi-structured interviews and case studies. Chapter five presents the discussion and conclusion regarding these results in relation to the theory. Furthermore, generalisability and a reflection on this thesis are provided. To conclude, chapter six contains the references mentioned in this thesis while chapter 7 consists of appendixes.

2. Theoretical framework

To understand how CBA and co-creation could help communities to become resilient against changes in climate, the definitions of, and relationships between these concepts should first be explained. This chapter provides an overview of the concepts and which conditions relate to them. This enables the creation of a conceptual framework to analyse empirical phenomena. First, the conditions of resilience and adaptation are explained. Based on these conditions, the conditions contributing to CBA and co-creation are linked. The chapter ends with a conceptual framework which explains the relationship between the concepts.

2.1. Resilience

Resilience is the capacity of a system to absorb disturbance and reorganise while undergoing change, in order to retain essentially the same function, structure, identity, and feedback (Walker et al. 2004). Davoudi (2012) describes three kinds of resilience: engineering, ecological, and evolutionary (i.e., community or socio-ecological resilience). While engineering resilience is defined as the ability of a system to return to an equilibrium or steady state after a disturbance, ecological resilience focuses on changing to a new equilibrium after a disturbance (Davoudi, 2012). The main difference is that ecological resilience acknowledges the existence of different stable equilibria, meaning that it is possible for the system to change into another stable state. These two types of resilience are based on the bounce-back ability of a system, which indicates a return to equilibrium. Due to this, use of the term resilience is often associated with emergency responses (Davoudi, 2012).

The third type of resilience is evolutionary resilience, which is also called community resilience or socio-ecological resilience (Davoudi, 2012). Folke et al. (2010) state that social and ecological systems are intertwined, meaning that this type of resilience pertains to people and nature as interdependent systems. Evolutionary resilience challenges the idea of equilibrium and advocates that the nature of systems may change over time, with or without an external disturbance (Scheffer, 2009). This indicates that systems do not return to normal, but rather change, adapt, and transform due to internal and external stressors (Davoudi, 2012). The relationship between climate changes and their consequences on communities is an example of such a socio-ecological system. Society causes changes in climate, and the effects of these changes (e.g., the urban heat island effect) affect society in return, the societal and ecological systems are thus interrelated. The socio-ecological resilience interpretation is therefore most appropriate to study and apply spatial dynamics.

2.2. Adaptation

Adaptation can be a part of resilience. It represents the capacity to adjust responses to changing external drivers and internal processes, thereby allowing for development of the current system (Folke et al. 2010). Due to the realisations that climate change is to some degree inevitable and

that mitigation alone is insufficient, there is an increased focus on adapting to the effects of climate change (Blackett et al. 2010). Adaptation seeks to reduce vulnerability, which is influenced by climate impacts as well as adaptive capacity. Climate change impacts increase the vulnerability of a system, while adaptive capacity can reduce vulnerability. Therefore, systems that have a high adaptive capacity are less vulnerable, even if they are exposed to climate change impacts. (Knittel, 2016). Improving adaptive capacity therefore increases the ability to foster more desirable outcomes when a system experiences stress. The outcome of this stress can be system-maintaining (i.e., resilient), or system altering (i.e., transformed) and depends on the system's adaptive capacity, which is a combination of the susceptibility of a system to harm and to achieve desirable states in the face of change (Engle, 2011). For communities, adapting to the impacts of climate change in a way which maintains the things they value about their community is likely to be a considerable challenge (Blackett et al. 2010). While adaptation efforts are important for preparing communities to cope with climate change impacts, sometimes these efforts are insufficient to address the magnitude of the impacts (McLeod et al. 2019), and therefore transformation of their way of living is needed.

MacKinnon and Derickson (2012) critique how the concept of resilience has been applied to places. They argue that resilience privileges the restoration rather than the transformation of existing relationships. Furthermore, being resilient is externally defined by government agencies and experts rather than by the subject who needs to become resilient. Kaika (2016) elaborates on this by stating that rather than making communities resilient, investigating what is causing the need to become resilient in the first place should be important. Rather than examining consensus, examine dissensus, (i.e., the causes of disagreement and conflict). This can be done by asking who should be resilient and why. Both articles make it clear that citizens should play a vital decision-making role in projects because they are the ones who need to be resilient and know the places of conflict and dissensus. Rather than using participation as a justification for planning, the focus should be on using participation as a community-centred concept and decision-making process.

2.3. Factors contributing to an effective resilience approach

To identify factors that contribute to effective community resilience and subsequently operationalise these factors, objectively-oriented approaches are not suitable due to the critiques of Kaika (2016) and MacKinnon and Derickson (2012). These approaches rely on external definitions; that is, measurements by experts rather than communities themselves. Therefore, subjective approaches that take into account what resilience means to communities and prompt them to self-evaluate their resilience should be considered (Jones & d'Errico, 2019). However, a problem with subjective approaches, is that factors such as social capital and other intangible processes are difficult to measure, which causes governments and experts to shift away from these approaches. Jones and d'Errico (2019) attempt to solve this by creating a subjective self-evaluation framework which helps communities understand resilience, not on the basis of government agencies and experts, which MacKinnon and Derickson (2012) critique, but by creating an overview of their own resilience-related capacities. This framework is useful for this

research because it gives an overview of important conditions for the creation of community resilience.

Other authors such as Fazey et al. (2018) and Twigger-Ross et al. (2015) describe overlapping conditions when compared to the framework of Jones and d'Errico (2019). Fazey et al. (2018) substantiate by stating that transformation rather than adjustments should be made and that adaptability and flexibility should be enhanced by working with diverse resources and capacities. Furthermore, a process of encouraging participation, learning, and empowering forms of change is needed to enhance both ownership and responsibility within a community (Fazey et al. 2018). This participation and learning process are also endorsed by Twigger-Ross et al. (2015), who describe key components of community resilience. Specific knowledge and skills are needed to address consequences of climate change and to understand existing capacities and vulnerabilities. Furthermore, funding opportunities and collaborative governance that engages and empowers citizens rather than using participation instrumentally can lead to solutions that challenge existing vulnerabilities (Twigger-Ross et al. 2015).

Both Fazey et al. (2018) and Twigger-Ross et al. (2015) describe participation and empowering communities, and learning through local and expert knowledge as important conditions for improving resilience. These conditions are not mentioned by Jones and d'Errico (2019), but indeed are important for community resilience, as they empower communities. This helps with identifying causes of disagreement and conflict within communities and counters the use of participation as a justification for planning.

Table 1 shows eight conditions for resilience, derived from Jones and d'Errico (2019). The conditions of learning and participation mentioned by Twigger-Ross et al. (2015) and Fazey et al. (2018) contribute to the table. Furthermore, explanations of conditions by relevant articles were added. Birkmann (2006) describes financial capital as the ability of a community to financially support itself in a time of need. Both financial independence and financial support from local governments are important indicators because being independent from others creates a sense of ownership, and receiving financial support from local governments could help create trust and be seen as a token of appreciation, which could stimulate communities. Political capital refers to a community's ability to connect with government resources and reflects the people's capacity to participate as agents in their community (Magis, 2010). Social capital relates to the need for a network within the community and is understood as the ability of a community to support itself from within the community, as well as create support through external relationships (Birkmann, 2006). This relates to the concepts of bonding, bridging, and linking which are conceptualised by Szreter and Woolcock (2004). Bonding relates to internal relationships in the community, while bridging refers to social networks across different social groups. Linking social capital relates to norms of respect and trusting relationships across power or authority gradients (Poortinga, 2012). These conditions can help communities to become resilient, though other conditions like local contexts and support from local governments can also play a part.

Resilience conditions	Explanation
Absorptive capacity	How to cope with or buffer the impacts of internal or external stressors (Béné et al. 2012).
Adaptive capacity	How vulnerable a system is to harm and the flexibility of the system when achieving desirable states in the face of change (Engle, 2011).
Transformative capacity	The system's ability to create new stable states by introducing new ways of living, thereby changing the variables that define the system (Walker et al. 2004).
Financial capital	The ability of a community to financially support itself in a time of need (Birkmann, 2006).
Social capital	The ability of a community to support itself from within the community, as well as obtain support from external relationships (Birkmann, 2006).
Political capital	Governmental and political support for resilience projects (Magis, 2010; Twigger-Ross et al. 2015).
Learning	Learning lessons from resilience projects, not only from experts or governments but also from local knowledge. (Twigger-Ross et al. 2015; Fazey et al. 2018).
Participation	Process of engaging and empowering local communities, enhancing both ownership and responsibility for action through processes that motivate and address power imbalances (Twigger-Ross et al. 2015; Fazey et al. 2018).

Table 1: Resilience conditions (derived from Jones and d'Errico, 2019; Twigger-Ross et al., 2015; Fazey et al., 2018).

Three aspects of socio-ecological systems determine their future trajectories: resilience, adaptability, and transformability (Walker, 2004). Part of the resilience-related capacities are covered by these aspects, namely transformative capacity, adaptive capacity, and absorptive capacity. Other conditions relate to capital and institutional aspects that influence how community resilience is created. Political, financial, and social capital, as well as participation and learning on a local scale, affect the resilience of a community and need to be taken into account.

In Table 1, a distinction is visible between capacity and capital factors. Capacity could be seen as an ability to reach a certain threshold. Building adaptive, transformative, and absorptive capacity therefore ensures that communities can become resilient, which means that they can not only tolerate more, but also transform and adapt to changes. These capacities are interconnected and reinforce each other, and thus, all are needed for communities to become resilient (Jeans et al. 2017). A community needs capital to strengthen these capacities, which could be seen as an asset capable of creating a future benefit for the next generation (Mauerhofer, 2013). Political, social, and financial capital are therefore assets capable of creating future benefit for a community. While social capital and capacity building are sometimes used interchangeably, these concepts have different meanings. Social capital is thought to supplement other types of capitals to help produce better outcomes (Carroll, 2001), and provides support for the production of different capacities (e.g., absorptive, adaptive, transformative) in communities through social networks (Pelling & High, 2005). Thus, capitals are resources that communities can use to

stimulate capacity building. To use these resources, collaboration between different actors as well as learning from each other is needed. Furthermore, social entrepreneurs within the community need to stand up in order to create beneficial value for all parties involved. Their goal should be the generation of sustainable solutions to community problems (Ratten & Welppe, 2011). Creating resilience is an ongoing process that requires time and learning, and collaboration is needed for communities to enable the use of resources.

In summary, a community's capacity conditions support resilience in the context of climate change, and those capacities can be achieved by the capital conditions which can be gathered through learning and collaboration processes. Climate resilience initiatives are processes of transformative social change, where learning, power, inequities, and relationships matter (Fazey et al. 2018). To create a resilient community, it is therefore important to understand the interrelatedness between capital on the one hand and capacities on the other and to research the process of creating resilience in which learning, power, inequities, and relationships play a vital role.

2.4. Community-based adaptation

Theodori (2005) explains two views of community, one which describes communities as social groupings or networks, and one which sees communities a place-oriented process of interrelated actions through which members of a local population express a shared sense of identity while engaging in the common concerns of life. The latter type of community is also called place-based community, and it is the one of interest for this thesis. Place-based communities consist of geographical, human, and organisational dimensions, meaning that communities are geographically located and comprised of humans with an organisational interest (e.g., adaptation; Theodori, 2005).

Community-based adaptation is a community-led process to cope with the impacts of climate change. It is based on the "priorities, needs, knowledge, and capacities of communities" (Reid et al. 2009, p.13). It operates at the local level in communities which are vulnerable to the impacts of climate change by identifying, assisting, and implementing development activities that strengthen the adaptive capacity of communities to live in a riskier and less predictable climate. With a community-based approach, adaptation strategies must be generated through participatory processes rather than being restricted to scientific inputs alone (Ayers & Forsyth, 2009). This means that expertise in vulnerability reduction comes from the community and is supplemented by rather than being based exclusively on scientific knowledge. While CBA is focused on poor communities in developing countries, it can also be used among vulnerable communities in more developed regions (Ayers & Forsyth, 2009).

Four aspects of CBA can be identified based on the literature (McNamara & Buggy, 2017, Ayers & Forsyth, 2009):

1. Focus on communities which are vulnerable to climate change impacts at the local level
2. Offer local development activities that bolster the adaptive capacity of communities to live in less predictable climates
3. Develop strategies for adaptation through active involvement of local stakeholders as well as experts
4. Address existing cultural norms and root causes of vulnerability to climate change impacts

The difference between a CBA or a normal adaptation project is that CBA focuses not only on the intervention itself, but also on how the intervention is developed (Ensor & Berger, 2009). Furthermore, CBA projects prioritise collaboration with local institutions and participation of communities in the process of assessing and planning for climate change risks (Dumar, 2010). By letting communities develop adaptation projects themselves, it is ensured that local priorities are identified and used to drive change from within the community instead of outside of it (Ensor & Berger, 2009). This means that CBA projects focus on including priorities besides adaptation through community involvement, rather than an external force (e.g., a project developer or local government) determining what is best for the community. Nevertheless, it is important that a CBA project is supported by local governments to ensure that value creation can be achieved through the bundling of resources and knowledge (Rawlani & Sovacool, 2011).

To create an effective use of CBA, the approach needs to include several enablers. Participatory approaches are needed to determine which adaptation measures could work in the local setting, as well as for the creation of community understanding. Furthermore, the socio-political contexts within communities and the local setting as well as implications for successful adaptation initiatives should be included. Lastly, adaptation should be supported at multiple scales with information flows, resources, capacity building, institutions, and policy (McNamara & Buggy, 2017).

Successful CBA is process driven and requires longer term engagement in which knowledge sharing and climate information are critical enabling factors (Mfitumukiza et al. 2020). Moreover, the use of participatory methods that support collaboration between actors in order to co-create solutions and develop networks and partnerships is urgent for sharing information, expertise, and resources (Mfitumukiza et al. 2020). One risk of CBA is that projects remain isolated initiatives. Therefore, operationalising conditions from other projects in order to help communities benefiting from their experiences is important. As such, the need to understand local governance and policy context in which initiatives operate is important because the success of CBA depends on this context (Reid, 2016).

2.5. Co-creation

Creating resilience requires both infrastructural adjustments such as enhancing dikes and societal changes (e.g., changes in water usage or private property use). While local governments are the owners of public spaces and are obliged to implement solutions in these spaces, private spaces such as gardens are owned by citizens. This division in space makes it difficult for a local government to implement adaptation measures in the whole of the municipality and creates a need for collaboration between local governments and citizens. Thus, adaptation is not only a complex technical issue but also a demanding matter of governance (Termeer et al. 2011). This means that actors need to interact with each other on different scales to reach a collective goal such as climate adaptation. An approach that focuses on this interaction between government and community is co-creation.

Co-creation has emerged from various backgrounds and practices, including marketing, public service management, urban planning, and design and innovation. There are various definitions of the concept, but co-creation refers mainly to the innovation and value creation which occurs as a collaborative process actively involving different actors (Lund, 2018). Voorberg et al. (2014) define co-creation as including citizens in the creation of outcomes that aim to address societal needs through an open process of participation, exchange, and collaboration with other relevant stakeholders. Citizens are seen as valuable actors who can help solve this societal need, but the role distribution between them and other stakeholders (e.g., the local government) may be unclear and cause friction. Actively involving citizens is more specific than the broad concept of participation, which could also refer to passive involvement (Voorberg, 2017). Thus, passively involving citizens in participation processes does not lead to collaboration between actors while active involvement does. Citizens should play a vital decision-making role in projects, being the ones who need to be resilient and aware of conflict and dissensus (Kaika, 2016). Furthermore, for an effective co-creation process which aims to create community resilience, enabling the production of creative knowledge and expertise from actors to create an environment that stimulates innovation is needed (Ehlen et al. 2015). This can be done by learning lessons from resilience projects, not only from experts or governments but also from local knowledge (Twigger-Ross et al. 2015. Fazey et al. 2018). This local knowledge includes practical experience and knowledge that is transferred from the community to citizens and is an efficient approach to reaching adaptation goals. Complex issues are more difficult to manage if citizens are only allowed to implement projects, risking a loss of creative knowledge (Lund, 2018). Creating community resilience therefore requires creative, local, and expert knowledge from which actors can learn lessons and in turn create efficient resilience approaches.

While co-creation is a useful approach for both public and private space, it requires a clear role distribution between the local government and citizens. Voorberg et al. (2015) discuss three co-creation roles which vary in the level of citizen involvement: citizens as co-implementers, co-designers, and initiators of projects. Co-production and co-creation are used interchangeably in literature (Jefferies et al. 2021), although a distinction is made by Voorberg et al. (2015). Whereas co-initiating and designing better fit co-creation, co-implementation indicates that actors work together in order to produce an outcome, thus fitting better to co-production. Co-designing and

co-initiating focus on collaborating to create new values. The difference made indicates that collaboration is a requisite for co-creation, while co-production indicates a cooperation. This distribution of roles distinguishes between the different approaches to citizen involvement. Active involvement of citizens correlates with co-initiating and co-designing, while passive involvement (e.g., consulting or informing citizens without giving them decision making power in projects) correlates with co-implementation.

The role of co-implementer indicates that certain tasks which were previously executed by the local government are now done by citizens (Voorberg et al. 2015). An example of this is a neighbourhood initiative established to maintain a certain area of greenery, a job that would have previously been done by the municipality. An advantage of this role distribution is that it is accessible to citizens and therefore accessible to everyone, thereby preventing exclusion in the community. A disadvantage, however, is that complex issues are more difficult to manage if an initiative is only allowed to implement, which risks a loss of creative knowledge (Lund, 2018).

In the dimension of co-designer, the local government initiates a certain project, while the citizens determine how it looks and how it is managed (Voorberg et al. 2015). An example is a plan by the municipality to stimulate greenery in a neighbourhood by offering a piece of public space where citizens create their own value, for instance by creating a garden. The design and management of the land is handled by the citizens while the local government initiated the process of value creation. Advantages of this dimension are that the local government is relieved by relinquishing certain tasks, while freedom in the design ensures quality value creation in the eyes of the citizens. Because it is initiated by the local government but not managed and designed, the initiative could take a great deal of time for citizens, who also have to be competent enough themselves, and it may become unclear who is responsible for what (Lund, 2018).

The role of co-initiator is the most demanding role for citizens, and its effective use requires social entrepreneurs. These are people who drive change processes for the benefit of the community (Lund, 2018). In this role of co-creation, the citizens who take the initiative to formulate specific value creation are self-organising and collaborate with public authorities to achieve goals (Voorberg et al. 2015). An example is the initiation of a civic initiative to adapt gardens for the impact of climate change by persuading people to green their gardens, providing information on the topic, and physically assisting people in greening their gardens. An advantage of this dimension is that ownership remains within the community, while the need for resources is a disadvantage (Lund, 2018).

There are drivers and barriers for co-creation in both communities and governments. Different aspects of this collaboration process are beneficial to each actor. Ehlen et al. (2015) explain different drivers and barriers to co-creation, which are important to understand how co-creation should be effectively implemented. To start a co-creation process, there must be a sense of urgency. For the creation of an efficient process, four conditions need to be taken into account, according to Ehlen et al. (2015): 1) an environment that stimulates innovation, 2) realising positive relationships between actors in the process, 3) enabling the production of creative knowledge and expertise from actors, and 4) active collaboration among all involved levels and actors.

Voorberg et al. (2015) add to this by providing other factors, differentiating at either the organisational (e.g., a municipality) or the citizen side of co-creation (see Table 2).

Factors on the organisational side	Factors on the citizen side
Compatibility of public organisations with citizen participation	Citizen characteristics (i.e., skills, intrinsic values, marital status, family composition, level of education)
Open attitude towards citizen participation	Awareness, feeling of ownership, being part of something
Presence of clear incentives for co-creation	Presence of social capital

Table 2: Factors of co-creation (taken from Voorberg et al. 2015).

By using the dimensions described by Voorberg et al. (2015), it is possible to link a role in the co-creation process to citizens. However, the role of the local government is vital to describe as well to create an overview of a possible role distribution. The International Association for Public Participation (IAP2) has created a spectrum which describes different participation roles a local government can adopt (i.e., informing, advising, involving, collaborating, and empowering; see Table 3; IAP2, 2014). The spectrum is primarily focused on defining a strategy for governments to involve the public in decision making processes and is based on Arnstein's (1969) ladder of participation (Davis & Andrew, 2017).

The lowest level of stakeholder involvement is informing, which means the local government provides information to citizens to create public understanding. The second level is consulting, which indicates that citizens are asked for feedback on proposed decisions. The third role is involvement, by which wishes and concerns are taken into account throughout the planning process. The fourth level consists of collaboration, in which the local government and citizens work together toward a solution, and local government not only involves citizens, but also incorporates innovative solutions which are proposed or requested by citizens. The last role for a local government is empowering citizens by placing ownership and decision-making power in their hands (Nelmarkka et al. 2014, IAP2., 2014).

	Inform	Consult	Involve	Collaborate	Empower
Public participation role	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions	To obtain public feedback on analysis, alternatives and/or decisions	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered	To partner with the public in each aspect of the decision, including the development of alternatives and the identification of the preferred solution	To place final decision-making in the hands of the public
Promise to the public	We will keep you informed	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision. We will seek your feedback on drafts and proposals	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will look to you for direct advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.

Table 3: Overview of the public participation spectrum (taken from IAP2, 2014).

Linking this spectrum to the three dimensions of co-creation creates an overview in which compatible role distribution between citizens and a local government becomes clear (see Figure 1). Certain roles juxtapose with certain co-creation dimensions. For example, a case in which an initiative is co-implementing does not work efficiently if the local government decides to empower the initiative because the initiative executes a process that the local government did previously. By subsequently giving the initiative complete freedom and support, a mismatch in roles is created. A better distribution of roles would be to consult or inform in such a situation so that the distribution of roles would remain clear. In the case of a co-designing initiative, the government should aim to adopt a role of involvement or collaboration. Only consulting or informing a citizen’s initiative would mean that designing a solution would become difficult because ownership is still in the hands of the local government. Empowering the initiative causes friction because the local government initiates the project in the case of co-designing, while the initiative joins and helps with designing. Finally, if citizens create value as co-initiators, it is important that a local government collaborates with or empowers that initiative. If the local government adopts a role of involvement, a conflict of ownership is created because the local government joins a project initiated by citizens. A role of informing or consulting could lead to problems with accumulating financial, political, and social capital, thus possibly limiting chances for value creation. In practice, there is no hard boundary between roles as they can overlap. A local government, for example,

has several departments that can assume a different participation role. This is shown in figure 1 by the space between the governmental roles. A municipality can therefore have a consulting participation strategy, but that does not mean that involvement is sometimes applied in practice as well. Figure 1 shows both governmental and citizens' roles and compatible matches between these roles.

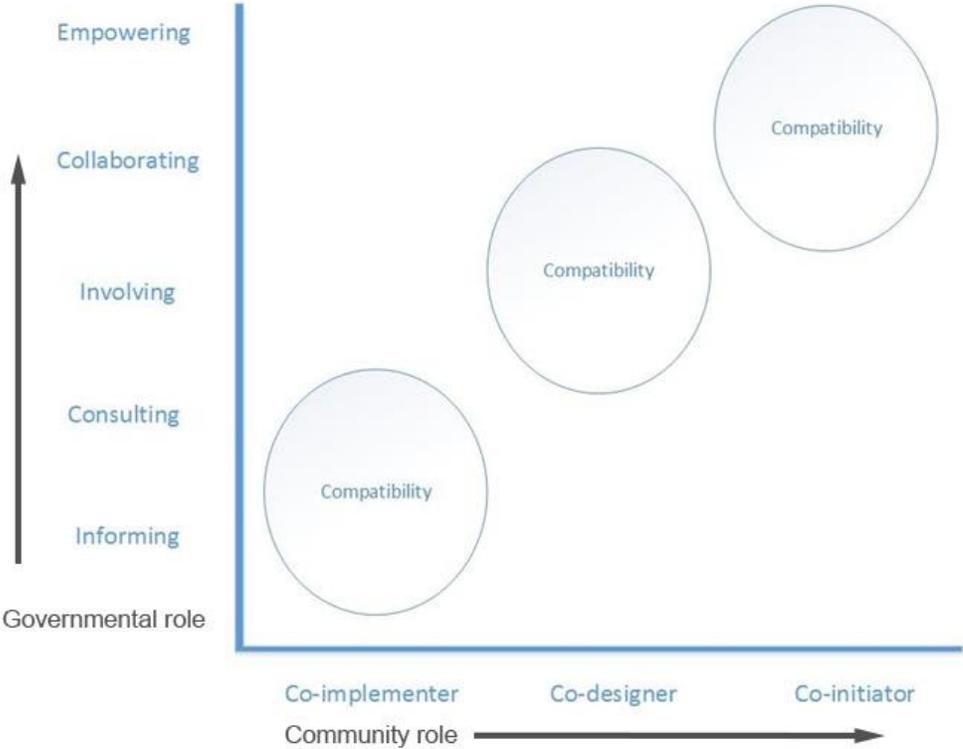


Figure 1: Explanation of compatible roles.

2.6. Operationalisation of conditions

Using the different conditions of resilience, CBA and co-creation, an overview is created that shows the overlap between these concepts. Resilience consists of eight conditions in which capital, capacities, learning, and participation are distinguished. For a community to become resilient, these conditions are paramount for preparation, as are other concepts which partly overlap with resilience conditions. Intensive participation is important for the creation of resilient communities because climate change impacts effects on a local scale, and communities know their vulnerabilities better than outsiders. By using participation as a community-centred concept and decision-making process, these vulnerabilities could be detected. Due to this, CBA could be used as a central concept within the creation of community resilience. Capital in the form of institutional and political support, financial incentives, social networks, cultural support, and other resources are key for creating resilient communities if bottom-up approaches are used. These capitals come from the communities themselves, but also from other stakeholders (e.g., water boards and local governments). To use these capitals and bolster their capacity to improve resilience, collaboration between stakeholders is necessary. If communities incentivise adaptation projects, it is important that local governments collaborate with initiators to reap the benefits of the project. The interrelatedness between stakeholders means that co-creation is an important factor for the effectiveness of local adaptation projects, as well as for the feeling of ownership within communities.

Certain conditions of co-creation, CBA, and resilience overlap and therefore are important (see Table 4). These conditions are used in the interview process to research how CBA and co-creation support communities in the Netherlands to become more resilient to climate changes. Resilience is a broad concept, making it difficult to research if a certain initiative helps with creating capacity and if conditions ultimately lead to resilience. By testing the conditions on the basis of case studies and interviews, missing factors that appear to be important can be added to the theory. These conditions can consequently be regarded as prerequisites for resilience, meaning that the presence of the conditions contributes to the preparation for, but not the creation of resilience. The final result of the thesis could therefore serve as a diagnostic tool for communities to assess if the conditions that could enable resilience are present.

	Resilience		Conditions	
	Capacities (absorb, adapt, transform)	Learning/knowledge	Participation	Capital (social, political, financial)
CBA Conditions	<ul style="list-style-type: none"> - Identifying and bolstering the adaptive capacity of communities 	<ul style="list-style-type: none"> - The usage of local knowledge - Addressing existing cultural norms and root causes of vulnerability - Expertise in vulnerability reduction comes from the community within and is supplemented by scientific knowledge 	<ul style="list-style-type: none"> - Active involvement of local stakeholders and experts from related fields - Participatory approaches to determine adaptation measures in the local setting and for the creation of community understanding 	<ul style="list-style-type: none"> - Adaptation should be supported by information flows, resources, capacity building, institutions, and policy
Co-creation conditions		<ul style="list-style-type: none"> - Stimulate innovation, learning and creative knowledge 	<ul style="list-style-type: none"> - Open attitude towards citizen participation 	<ul style="list-style-type: none"> - Compatibility of public organisations with citizen participation - Presence of clear incentives for co-creation - Presence of social capital

Table 4: Overview of conditions.

2.7. Conceptual model of conditions

This section presents a conceptual model (see Figure 2). This model creates an overview of the theoretical framework and illustrates relationships between different concepts, as well as how these concepts in turn help communities with identifying conditions that support the creation of place-based adaptation solutions to bolster resilience.

First, financial, social, and political capital is available through local actors (e.g., local governments, citizens). A distribution of roles between these local actors generates the accumulation of capital. When compatible, the role distribution leads to a collaboration process in which the allocation of capitals is used for community value creation. Learning, knowledge, and active participation processes turn the role distribution in co-creation, while passive participation hampers collaboration processes, thus meaning that active involvement is a requirement for co-creation. The co-creation process stimulates the creation of value, while CBA processes help the community to cope with climate change impacts. Using these approaches helps with building capacity at the local level, leading to a presence of prerequisite conditions for community resilience.

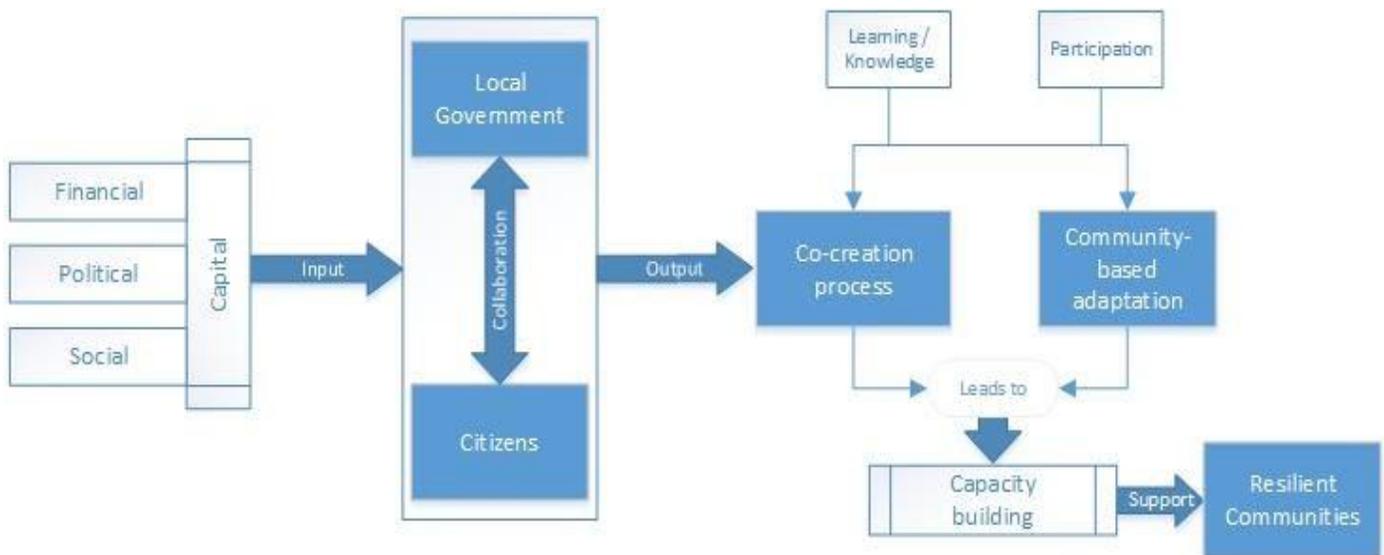


Figure 2: Conceptual model.

3. Methodology

This chapter explains the methodology to answer the main research question:

“How can community-based adaptation and co-creation support communities in the Netherlands to become more resilient to climate change?”

The research model schematically displays the steps taken in this research (see Figure 3). First, relevant theoretical concepts were explored and a conceptual model was built. Data from interviews and case studies were subsequently analysed to create results that explain how CBA and co-creation support communities in the Netherlands with adapting to climate change, and how conditions could be operationalised for other projects. Lastly, a conclusion and recommendations were formulated.

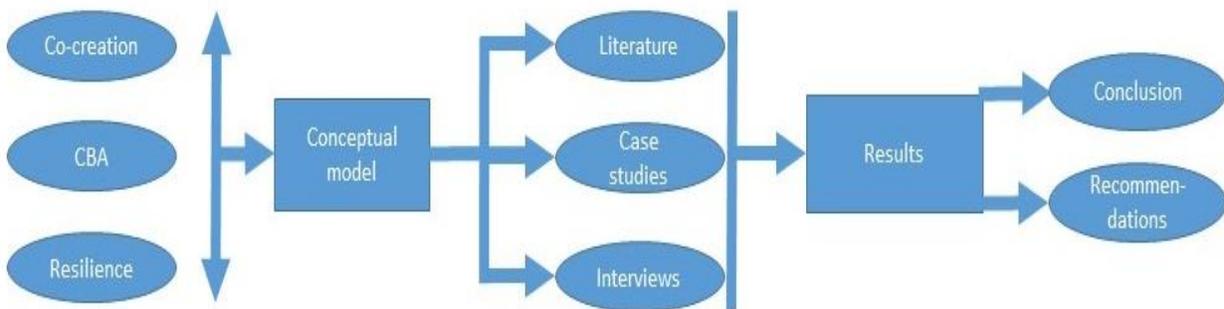


Figure 3: Research model.

3.1. Research approach

Sayer (1992) differentiates between intensive and extensive methods. Extensive methods aim to research patterns and properties within a population as a whole. Intensive research is more typical to use in qualitative research and aims to explain how a causal process works in a particular case or in a limited number of cases (Sayer, 1992). This thesis researches a limited number of cases to understand how the process of co-creation and CBA support communities with adaptation projects. Therefore, an intensive research approach fits best, because it focuses on researching processes in a limited number of cases in depth, while extensive research focuses on common properties in populations as a whole. Using an extensive research approach in this case is not considered the right course of action because only a group of cases is studied in depth by the use of interviews. Furthermore, quantitative research is not suitable for this research, because the conditions to be researched are difficult to quantify. For instance, it is difficult to understand social networks, relations, and role distributions through quantitative research. Additionally, the local context of each case may also influence the outcomes, creating difficulties for this method. Thus, qualitative research was conducted in the form of interviews.

First, by using the theoretical framework, insights on resilience, CBA and co-creation were used to create an overview of key conditions that support vulnerable communities with adaptation projects. The next step was conducting case study research as well as interviews to determine how the findings of the theoretical framework are used in practice. Furthermore, literature research was used to attain a better understanding of the conditions supporting adaptation projects. To create an understanding of knowledge out of practice, interviews were conducted with actors from the adaptation projects.

3.2. Case study research

Boundaries for case study research are determined by the time span of the research as well as the spatial and theoretical (Chapter 2) boundary (Yin, 2018). Collecting data through interviews was done in 11-2020 and 12-2020, although interpretations of participants were based on experiences before this time period. This thesis focuses on civic initiatives aimed at climate adaptation in three different municipalities in the Netherlands to understand how CBA and co-creation support initiatives aimed at climate adaptation. Multiple case study research has been chosen as the research method because that way differences in role distribution can be examined and the conditions arising from the theory can be studied in different local contexts (Gustafsson, 2017). These differences in context can expose new conditions that, in addition to the conditions arise from the theory, help with supporting adaptation initiatives. The context of the Netherlands was chosen because communities in the Netherlands increasingly face severe climate impacts such as flooding. In the face of increasing climate risk, communities in the region are leading climate adaptation strategies to build resilience in their communities and ecosystems (McLeod et al. 2019). The results of this research are generalisable for other civic initiatives aimed specifically at climate adaptation because the researched conditions derived from theory are aimed at this domain. Nevertheless, it may be difficult to use the outcomes of this study in other countries with different governmental structures, organisational cultures, or lacking resources, because these can influence the conditions (e.g., active participation, financial capital) that are needed for supporting initiatives.

A case study is defined by Gerring (2004) as an intensive study of a spatially bounded phenomenon or unit, with the aim to generalise outcomes to a larger set of units. Case studies are a useful way to gather in-depth information and to clarify processes or relationships between stakeholders (Flyvbjerg, 2006). Seawright and Gerring (2008) explain seven types of case studies, each of which correspond to different case analysis strategies. This thesis uses the 'typical' case study method to test the link between theory and practice within the unit and to test whether the used theories are properly applied in practice or if there are any comments on the theory. A typical case study method is relevant for this thesis because it focuses on one or more units with a cross-case relationship and attempts to examine causal relationships that confirm a given theory (Seawright and Gerring, 2008). By conducting three case studies in particular local contexts, conditions that might support communities aiming to create community resilience are examined while recognition of other conditions helps with creating a better insight in which conditions form a driver or barrier for adaptation initiatives.

3.3. Case selection

To parallel practice and theory, the selection of cases is based on the applicability of the theory. To select cases, it was first important that the activities of the initiatives were created by the initiative itself to be able to investigate how CBA was applied. In addition, a partnership between the initiatives and the local government is important to examine the role distribution. All three cases at least cooperate with local governments, although it was not clear beforehand what exact roles the actors play. This became clear through the data collection process. Finally, a specific search was made for cases which focus on climate adaptation through creating green spaces at the local level. The exact criteria for the selection of the cases were as follows:

1. The initiatives are active in the field of climate adaptation by implementing green space at the local level.
2. The activities of the initiatives are created by active citizens, thus community-based.
3. The local government and initiative work together to create value in the living environment.

While the cases are chosen based on these three criteria, there are still differences between them. For instance, the distribution of roles between the community, the local government, and other actors is potentially different in each case. Furthermore, the spatial context of the three chosen cases is different, which could also lead to changing the process outcomes. To specify, the scope of one case is aimed at the neighbourhood level in a big city, one at a city as a whole, and one at three different villages, creating an opportunity for comparison and for analysing conditions that arose in the data collection process. This is important because there is little point in cross analysis if the cases do not have variations (Gerring, 2004).

3.4. Case descriptions

The following section provides an overview of the three studied cases. Table 5 shows the location, founding year and main aim of each initiative. Subsequently, each case is described with more detail and the reason for picking is explained. By researching the roles of both the initiative and the local government, an overview of which conditions support communities with creating adaptation approaches will initially be created.

Name/logo	Moment of creation and the location	Main aim of initiative
 Tuinambassadeurs Gouda	2017, Gouda.	To create awareness for the impacts of climate change by hosting activities, providing information and garden advice to citizens, as well as the creation of activities for citizens to green their own garden.
 BuurtGroenBedrijf	2018, Arnhem, Spijkerkwartier neighbourhood.	To generate a pleasant living environment by creating a future-proof neighbourhood through greening activities with the community.
 KANT	2020, Vught, Helvoirt, Cromvoirt.	To unite residents to create a better living environment by designing gardens to collect more water and to counteract the impact of heat stress in the three villages.

Table 5: Overview of each case.

3.4.1. KANT

Klimaat Adaptieve Natuur en Tuinen (KANT) is a civic initiative located in Vught, Helvoirt, and Cromvoirt in the south of the Netherlands. This local initiative aims to unite residents to create a better living environment by designing gardens to collect more water and to counteract the impact of heat stress in the three villages. The aim of the initiative is to limit the effects of climate change at the local level, with the result that the residential areas are more resilient in regard to heavy rainfall, less heat stress is experienced, and more biodiversity is created. The initiative aims to have at least 250 green and climate-resilient gardens in the area by the end of 2022. The initiative was created by local citizens and is a place-based community with an interest in adapting gardens to climate impacts by the use of a platform. KANT (2020) states that a citizen initiative works better if the local authorities are supportive and help the initiative. A citizen initiative is also positive for the municipality. In this case, a collaboration takes place between the municipality and the community. Due to this, the case is useful for researching the supporting conditions of both CBA and co-creation.

3.4.2. BuurtGoenBedrijf

The second case is called the BuurtGoenBedrijf, which is located in the neighbourhood *Spijkerkwartier* in Arnhem. The aim of this initiative is to generate a pleasant living environment by creating a future-proof neighbourhood. Core values aim to generate ecological, climate adaptive, social, and economic values in the neighbourhood via activities aimed at adding more nature (BuurtGroenBedrijf, 2020). The BuurtGroenBedrijf is part of a living lab in which various actors (e.g., the municipality, the business community, knowledge institutions, and citizens) collaborate. Community values are stimulated by organising activities in the *Spijkerkwartier*

neighbourhood that aim to alter private and public space into green spaces. By using this case, this thesis studies a project that is created by both parties. Because there is a mutual interest for these parties to achieve adaptation objectives, research aimed at how and if collaboration is happening in practice is important

3.4.3. Tuinambassadeurs Gouda

In Gouda, an increase in heavy rainfall caused by climate change increases the risk of flooding and hotter summers create an urban heat island effect. Due to this, the municipality of Gouda joined a national campaign for municipalities called *Operatie Steenbreek*. This campaign helps municipalities and initiatives with climate adaptation and the creation of a greener living environment. Within the national *Steenbreek* campaign, municipalities, along with residents, organisations, and companies, determine their own approach to achieve this. Through the use of Tuinambassadeurs (i.e., a group of citizens in Gouda), the municipality of Gouda aims to create an initiative that persuades citizens to make their gardens more nature-friendly to limit climate change effects. The main aim of this group is to create awareness for the impacts of climate change by hosting activities, providing information and garden advice to citizens, as well as the creation of activities that help citizens with creating climate adaptive gardens (Tuinambassadeurs Gouda, 2020). The roles of the local government and the initiative are different from the other cases because the municipality is the project initiator. This change in roles could lead to interesting data which, in turn, could help to better understand how changes in role distribution between actors influence the conditions that are prerequisites for community resilience.

3.5. Data collection process

To answer the main question of this thesis, this study uses qualitative research in the form of semi-structured interviews. Semi-structured interviews provide detailed information. In addition, a semi-structured interview provides the opportunity to ask specific questions about a subject (Reulink & Lindeman, 2005). Due to this flexibility, further inquiries can be made if interesting topics come up during the interview that do not follow from the conceptual framework.

Using the snowball method, by which participants are asked if they know of other possible respondents (Longhurst, 2010), can create a link between the cooperating parties of both the communities and the local government. This method was applied in the research by using the websites and contact information of initiatives as a starting point, and subsequently asking them about network relations involved in the role distribution. This way, the relationships with other actors (e.g., local governments) were featured in the data. At the end of each interview, participants were asked if they knew other contacts who have collaborated with the initiative. A disadvantage of this method is that there is a possibility that too many like-minded people will be interviewed.

Initially, the aim was to give the participant the decision power to choose the location and date for the interviews to ensure that the participant had the time and would therefore provide thorough answers. In addition, meeting at a location chosen by the participant creates a familiar atmosphere, which benefits the answers and the time spent by the interviewee on their answers (Clifford et al. 2010). Due to Covid-19, interviews were held online and this decision power was applied by being flexible in which online meeting programme was used. Most interviews were conducted by the use of Google Meet, while two interviews were held with the use of Microsoft Teams. Table 6 shows an overview of the participants, their function in either the municipality or the initiative, the date of the interview and how the participant was found.

Municipality/ Initiative	Participant	Function	Date of interview	Approached via
Vught/KANT	1	Coordinator within initiative	26-11-2020	KANT website
	2	Active within initiative	10-12-2020	Snowball method via Participant 1
	3	Coordinator of public space management	17-12-2020	Simultaneously interviewed with Participant 4
	4	Staff member (green maintenance)	17-12-2020	Snowball method via Participant 1
	5	Staff member (water, sewage and climate adaptation)	18-12-2020	Municipal climate adaptation report
Arnhem/ BuurtGoenBedrijf	6	Coordinator within initiative	08-12-2020	BuurtGoenBedrijf website
	7	Active within initiative	16-12-2020	Snowball method through Participant 6
	8	Spijkerkwartier neighbourhood manager	09-12-2020	The municipality
Gouda/ Tuinambassadeurs	9	Coordinator within initiative	14-12-2020	Tuinambassadeurs website
	10	Active within initiative	23-12-2020	Snowball method through Participant 9
	11	Account manager for civic initiatives	18-12-2020	The municipality

Table 6: Information about interviews and participants

3.6. Data analysis

The interview data was analysed using deductive coding, which means that the coding is based on theory (Clifford et al. 2010). By using the conditions described in the theoretical framework, an overview of each topic was created. After the interviews were held, the transcriptions were checked for concepts that often recur and are not yet explained in the theory. Therefore, inductive coding was also executed via Atlas.Ti., a program which creates a simple summary of each condition after the coding is complete. Appendix 1 shows the coding scheme that was used. To increase the reliability of the data, the same interview guide was used for all members of the initiative as well as for participants of the municipality. This ensures that the data can be compared. There are differences in the questions for each participant, due to their different roles in the projects. Nevertheless, some differing questions were asked because of the semi-structured design of the interviews. Appendix 3 shows the interview guides used.

3.7. Ethics and limitations

The interviews of this thesis were conducted online, which had disadvantages for non-verbal communication and may also yield shorter or less in-depth answers due to a reduced connection between the participant and the interviewer. This online form of interviewing was necessary due to Covid-19. By using a semi-structured interview approach, the data was collected consistently for each interview. In addition, multiple case studies on the same subject ensure that a comparison can be made. All cases cohere to an initiative with regard to climate adaptation that has been set up by citizens and is supported by local governments.

When using interviews as a method, it is important that the collected data is handled confidentially. The rights of affected individuals, societies, and environments must be protected while conducting research (Clifford et al. 2010). Furthermore, gathered data should be dealt with confidentiality and secure. To ensure that these conditions are met, the participant were informed about the purpose of the interview and how it would be conducted. It was made clear to the participant that the interview was conducted without obligation and that it was possible to take a break or stop the interview. Furthermore, it was asked whether the name of the participant could be used or whether the person prefers to participate anonymously. Recording the interviews makes it easier to transcribe and by the use of OBS Studio software, recordings were made. It is important that the data is handled securely. This was done by saving the gathered data in a password locked folder on a password protected computer. Furthermore, the interviews were transcribed and the recordings were deleted afterwards, reducing the chance of accidents with the data. Participants were asked whether recording was allowed, and informed that the interview was held with discretion with regard to privacy. This was done by the use of an informed consent form (See appendix 2).

4. Results

The results obtained during the interviews are presented in the following sections. First will be analysed how the different conditions (presented in the operationalisation of Chapter 2) play a role in the cases. Second, the distribution of roles and their compatibility will be discussed. Third, the different capacities of resilience will be analysed

4.1. Capitals

The first section of this chapter focuses on the financial, political, and social capital. For each case, the presence or absence of these capitals is analysed. The section concludes with a synthesis, an overview of the capitals for each case, and an explanation of what this means for the resilience of the community.

4.1.1 Financial capital

To research the presence of financial capital in a specific case, interview questions asked about how the case was funded and whether the financial capital was abundant. Birkmann (2006) describes financial capital as the ability of a community to financially support itself during a time of need. Therefore, not only financial support from local governments but also financial independence within the initiative should be present for a community to possess financial capital. This does not necessarily mean that the initiative should have its own income streams because freedom over financial capital without quid pro quo could also lead to independency. However, it is important that a sense of ownership and social entrepreneurship is present and that financial providers trust the initiative and do not withdraw their support.

In the case of KANT in Vught, financial capital is present because the initiative has full ownership of subsidies from local governments, which reflects a vote of confidence from the local authorities. Within the initiative, two financial sources are present. Both the municipality of Vught and water board the Dommel provide funding, with the municipality providing for multiple years and the water board promising to double the municipality's subsidy. Other financial support comes from the local governments, in the form of supporting by funding operational costs such as a social media campaign, as well as the establishment of a website. To receive funding from the municipality, the initiative needs to complete three projects a year, but designing these projects rests with the initiative. Funding by the initiative itself is not present, although Participant 1 states that the funding responsibility lies entirely with the initiative.

“They give us money, but in fact we do not have to account to the municipality how the money is spent. We only have one deal, and that is that we are accessible, combined with the fact that we carry out three public campaigns per year. If we deliver on that, no one will ever ask how the money they give us is spent” (Participant 1).

To create a project within the community, an initiative should have an entrepreneurial mindset and vision, according to Participant 3. Participant 2 is part of the initiative by the means of his own

general partnership (VOF) which, for a small contribution that is disproportionate to the number of working hours, helps with all kinds of initiatives in the region. Social entrepreneurship is thus present within the initiative of KANT.

In the case of the BuurtGoenBedrijf in Arnhem, financial capital is present to a certain extent. Both social entrepreneurship and project-based funding lead to some degree of financial capital, but structural funding with ownership of spending or covering funding from the initiative is not available at present, leading to no guaranteed continuity, though this could change in the future because the basis for covering funding by the initiative exists. The initiative does not receive structural financial support from local governments as KANT does, but rather receives project-related funds from the municipality. Participant 8 indicates that the municipality is considering structural funds but also states that funding every initiative leads to inefficiency and more costs for the municipality, and an initiative also has the responsibility to consider itself as a sort of company where the income does not depend entirely on the municipality, meaning that social entrepreneurship needs to be present.

“We are trying to look at options for funding, but it is no longer of this time that the initiatives are only supported by the municipality. Because then, in my view, you get all kinds of inefficient initiatives that do little but get money. That is why that professionalism is also necessary. As a municipality, we do look for possibilities and if there are opportunities, we also provide financing where you can finance the start or set-up. But parties themselves also have some responsibility to look for other means” (Participant 8).

Other funding comes from non-governmental organisations such as the *Oranje Fonds* and from paid assignments that are executed by the initiative. Although financial capital is available and social entrepreneurship in the form of paid assignments exists, the current financial state does not guarantee continuity in the long term, according to Participant 9. Either through structural funding from local governments without a quid pro quo or an effective financing structure from the initiative itself, financial capital in this case could be improved.

The case of the Tuinambassadeurs Gouda is different from the other cases because the municipality is the initiator of the initiative, which affects the financial capital of the initiative, as social entrepreneurship is not present. In general, the initiative has ownership over received funding, leading to independence. This ownership leads to a mismatch because the project is initiated by the municipality, and the role distribution between the municipality and the Tuinambassadeurs is not fitting for ownership due to a lack of social entrepreneurship within the initiative caused by the municipality being the initiator.

The municipality of Gouda was an Article 12 municipality, meaning spending needed to be reduced and the national government took guardianship over finances. Despite the municipality's financial state, the Tuinambassadeurs receive financial support from the municipality. The municipality has called itself a directing municipality, which means that it becomes difficult for initiatives to find the right contact within the municipality. Because the municipality has been under guardianship and financial capital is still not abundant, the capacity of the civil servants is affected.

The municipality is no longer under guardianship and does see the urgency to support civic initiatives, so according to Participant 9, a change is visible.

“The municipality of Gouda has mainly made its expansions on soft peat soil and so they had enormous shortages to prepare that soil for construction. Due to that, the municipality is pretty poor. The municipality has closed their own park service and they have outsourced it. So, there are also no officials at the town hall who coordinate this” (Participant 10).

In terms of social entrepreneurship within the initiative, Participant 11 indicates that the initiative had proposed a more business-like process, for example by asking for a contribution for certain activities, which would benefit financial capital and continuity. However, because the initiative was started by the municipality, they have the final say and did not approve that plan.

“There have been informal proposals from the Tuinambassadeurs before where they suggested to run the initiative for a fee, to give advice and charge a bit of money for it. But the municipality disagreed with the initiative because you can always hire a gardener for something like that. We also do not ask for a complete design or something, they advise about how to create a healthy and climate adaptive garden” (Participant 11).

The municipality views the Tuinambassadeurs as advisers and does not necessarily ask for designs. Municipal budget cuts caused difficulties in the collaboration process, but the initiative still receives funding from the municipality. Social entrepreneurship is lacking because the municipality is the initiator of the project, which causes a conflict of ownership between the initiative and municipality. Therefore, financial capital is present, but continuity of the initiative is not guaranteed because social entrepreneurship is a missing factor, as ownership in this case is unclear.

4.1.2. Political capital

To understand if the civic initiatives studied have access to resources, power, and the ability to impact regulations, initiatives and local governments were asked about how they are connected with each other, if the initiative was involved in climate adaptation plans, and whether initiatives could also affect local plans. These questions relate to the creation of political capital, which refers to a community's ability to connect with government resources and reflects the people's capacity to participate as agents in their community (Magis, 2010). In other words, political influence leads to participation in and ownership of decisions that are made within the local government about problems that affect the community. This sort of capital is necessary to create community resilience because actively involving citizens in the planning process ensures value creation in the eyes of the community, while underrepresented groups also have a chance to be heard.

KANT has political capital for three reasons. First, the initiative has several contacts within the municipality with whom they consult. These contacts work in the water, sewage, climate adaptation, and landscaping departments and help the initiative by connecting them to the municipal organisation. Secondly, there are several active members who are also part of the city council. This can be seen as political capital, although Participant 1 mentions that these people

are not part of KANT as municipal councillors, but rather as citizens. This is important to note because a citizen could see the initiative as part of the political party this person is affiliated with, which could have a deterrent effect. To mitigate this risk, the initiative takes an objective approach with regard to municipal politics because involving political parties in KANT could negatively affect the goals of the initiative. Nevertheless, the connection with the city council indicates that the initiative has political capital.

“One of our initiators is active in the city council herself and has to be very careful that she does not play a double game [...] because KANT could be associated with her party and then we are seen as a political movement. We are therefore very consciously working to prevent that. We have a personal opinion about all those political parties, but they are all equally dear to us” (Participant 1).

The third reason KANT has political capital consists of the initiative’s consulting role within the municipality. The initiative was created after the municipality consulted with citizens for their new climate adaptation report, resulting in an active group of citizens that started KANT (Participants 1, 5). Furthermore, the initiative was exemplified in many party plans during recent local elections (Participants 1, 2), and participated in discussions about the municipality’s heat plan, but they have no real influence on the contents of these plans.

With regard to political capital, the BuurtGroenBedrijf has certain network connections within the municipality, and the municipal administration is also aware of the effectiveness of the BuurtGoenBedrijf, yet there is a lack of involvement with the municipality’s adaptation plans since the initiative is more focused on the neighbourhood level rather than a municipal scope. The initiative collaborates with civil servants to realise projects at the neighbourhood level.

“I have also worked with one person of the municipality who is responsible for our neighbourhood, and he is already well involved with the BuurtGroenBedrijf. So, when we want to do stuff, he can help us make it happen. For instance, he helped us with the permits for our bokashi project and when you say his name for something like that it is green light. I think once you have that one person on board that is maybe a bit higher up in the municipality and you mention their name, then it is easier” (Participant 7).

In Arnhem, there is a *Groenlinks* alderman who ensures that environmental issues are high on the agenda within the municipality, but Participant 6 indicates that having a policy is the first task and implementing it municipality-wide is the second task. The municipality has neighbourhood managers and district managers who provide an entrance into the municipality for citizens. The BuurtGoenBedrijf is in intensive contact with these civil servants to align municipal and initiative plans. Participant 8 indicates that the BuurtGoenBedrijf is increasingly mentioned within the municipality as a party within the Spijkerkwartier to work with, but they are not yet involved in climate adaptation plans. Although the initiative is not consulted about municipal policies, they collaborate with the municipality to realise projects at the neighbourhood level. The BuurtGoenBedrijf is in charge of its own projects and the civil servants who manage greenery and the municipality collaborate to provide support (Participants 6, 7). In conclusion, the BuurtGroenBedrijf has political capital due to their collaboration with different departments of the

municipality, although this collaboration is focused on the neighbourhood and therefore no municipal-wide political capital is present.

Political capital in the case of the Tuinambassadeurs is available to a limited extent because, on the one hand, the initiative is asked for advice by the municipality and the urgency to adapt exists within the municipality; on the other hand, the financial situation and the lack of capacity it causes leads to an inefficient work relationship between the municipality and the initiative.

Participant 11 indicates that Gouda has a council that considers to realise more greenery and of which the alderman for green is also from the Green political party (*Groenlinks*). In addition, there is a council working group that focuses on climate adaptation, so there is recognition of the importance of the subject. Contact with the municipality on these subjects is slow, due to the financial situation of the municipality, with the result of a small organisation and lack of capacity within the municipality.

“The municipality is trying to be more active in contact with the Tuinambassadeurs, but it just has a lot to do with capacity. Because at the moment that a project is started for the construction of façade gardens, you have a kind of minimal variant in which a municipality could say, you can just create a garden and it must comply with this, but as a municipality you could stimulate it more intensively as well” (Participant 11).

Additionally, due to a change in municipality personnel, contact has temporarily deteriorated, but according to Participant 9, a new civil servant has been appointed who knows how to achieve certain goals within the municipal organisation that the Tuinambassadeurs have wanted for a long time but could not manage to achieve. Participant 9 also indicates that appointments were planned with council committees to strengthen the ties between the municipality and initiative but that these agreements were cancelled due to Covid-19. This has caused most contact with council committees to come to a standstill, but there is an interest in advice and the topics related to the Tuinambassadeurs. To conclude, there is little political capital because the small municipal organisation does not have the capacity, and contact is therefore difficult to maintain.

4.1.3. Social capital

Creating community resilience goes hand-in-hand with creating a social network within the community, as well as with the creation of external networks and the presence of respect and trust in these relationships. Social capital relates to this need for bonding, bridging, and linking, and it is understood as a community’s ability to support itself from within the community, as well as to secure support from external relationships (Birkmann, 2006). All these types of social capital are needed, as they are interrelated and relate to the effectiveness of other conditions such as knowledge and learning. If, for instance, bridging capital is missing, learning and receiving expert knowledge becomes more difficult. By researching how a community is created within the different cases, how other citizens are involved in the initiative, and what relationships they have with other initiatives, for instance, the social capital of each case was researched.

Concerning social capital, KANT has a strong internal network, but the external network is small-scale. These bonding and bridging relationships consist of trust and respect, which is also reflected in the success of the initiative and the influence they have in the community. KANT consists of a group of 10 volunteers, most of whom are still active in their work field, from which they also bring in networks. The group consists of both older and younger members, which improves the connection with the community and helps establish successful activities.

“In my naivety, I thought that it was not a good idea when three people from our group said that they were going to set up a rain barrel action because I thought it would just be four months of peddling. But after 10 days the barrels were sold out and we went back to the municipality with the question if they could add 1,000 euros and then we bought another 50. We ended up selling 150 in 17 days. That is such a positive surprise and that really motivates us” (Participant 1).

KANT uses social media and local media to reach the community. For example, local websites and newspapers are approached to advertise, and messages on social media are also repeated by the municipality, although communication with the municipality is not yet smooth (Participants 1, 2). The initiative aims to create brand awareness in the community to promote urgency concerning climate adaptation. Within the community, KANT is also becoming more recognisable. Although the initiative has only been running for six months, they are regularly approached by people for garden advice. They also help establish other initiatives, for example, by using their foundation to apply for a subsidy for a green roof initiative. There is contact with the municipality as described in the political capital chapter, but according to Participant 4, there is also collaboration with other adaptation initiatives in nearby municipalities. One disadvantage of civic initiatives is that having time for an initiative such as this can be seen as a luxury, and it may be more difficult to reach people who have fewer financial resources because they are busy with more demanding tasks. This can lead to inequality because these people may not be sufficiently included in the initiative.

“I think that volunteering also has a kind of luxury in it. If you earn well, you can afford to do other things voluntarily as well. But if you are on welfare support or you have two jobs to keep things going, you don't have the luxury of being a volunteer. So, it is also a bit of a luxury, apparently you can afford to provide your services for nothing. So volunteering, I find it a bit debatable” (Participant 2).

Bonding, bridging, and linking are present in the BuurtGroenBedrijf and therefore social capital is in stock. The BuurtGroenBedrijf currently has a core team of four people who assist on a part-time basis. It is surrounded by a network within the community from which they invite citizens to help with activities, and people from the neighbourhood can register to help. There is a group of people who actively participate in various activities, and there are also people who join occasionally (Participant 7). By voluntarily improving the living environment in the neighbourhood, the initiative creates interaction with the community.

“The goal of the initiative is to make the neighbourhood greener but also more social. So, making it greener grows to the social part. And it's not making it for the people but with the people, so they take ownership of the greenery” (Participant 7).

Creating greenery in the neighbourhood therefore serves as a binding agent for the community and as an approach to climate adaptation. Participant 7 indicates that new contacts are made by means of street actions, and behavioural changes are created because people get the feeling that the entire neighbourhood is helping and consider it to be the way things are done in the Spijkerkwartier. In addition to the network built by these activities in the community, there are contacts with other initiatives. In Arnhem, there is a platform (*Arnhem Klimaatbestendig*) for initiatives, governments, and other parties involved in climate adaptation, where a great deal of information and support can be obtained. In addition, there is also an initiative in the district itself called *Circulair Spijkerkwartier*, with which there is cooperation to improve the living environment in the neighbourhood (Participant 6). The BuurtGoenBedrijf is part of a key partner meeting in which the municipality also participates. This includes partners who can support the initiative, such as universities whose students conduct research within the neighbourhood and through which the municipal maintenance department has contact with the initiative. To conclude, there is a network within the neighbourhood and within the city that the initiative uses to achieve objectives and implement projects jointly; thus, social capital is abundant.

While bridging with other initiatives and organisations happens regularly, bonding within the community lacks in the case of the Tuinambassadeurs. Furthermore, trust in the initiative lacks within the municipality and community, mainly because the urgency of climate adaptation is lacking within the community. Moreover, the capacity of the municipality is used for soil subsidence problems, not for climate adaptation. The Tuinambassadeurs consist of 10 active members who regularly hold meetings, although due to Covid-19 this happens less frequently and online. They have relationships with other initiatives and organisations that are working on climate adaptation, and the Tuinambassadeurs are invited to advise and help with relevant projects.

“In addition to advising, they are also busy with creating gardens in front of houses and the like. But it is not very structural. Last year, there was an action for facade gardens, where the Tuinambassadeurs are cooperating with a few other parties in a neighbourhood to realise this for residents. So, the Tuinambassadeurs do a lot in that area, but of course they are volunteers and they are a bit searching for the role of the municipality” (Participant 11).

By connecting with related projects and advertising in a street or neighbourhood, it can be ensured that awareness of the Tuinambassadeurs is created and the urgency of climate adaptation becomes clear. Furthermore, the Tuinambassadeurs are part of *Operatie Steenbreek*, which serves as a platform for initiatives related to climate adaptation.

“We have a press list of several organisations to ask them if they can publish something. That way, you try to create awareness” (Participant 9).

Despite collaboration with other initiatives and parties, and therefore a bridging network, the connection with the community itself is limited. This is mainly because the initiative was founded by the municipality and the scope of the initiative is aimed at Gouda as a whole, making it difficult to build a community. The Tuinambassadeurs are involved in an external network of initiatives within the municipality, although internal connection with the community is missing because the initiative is created by the municipality, which makes it more challenging to find connection.

4.1.4. Synthesis

To understand the impact of the different types of capital on the creation of resilience, a synthesis follows. Table 7 shows the different capitals for each case. The scarcity of a certain capital shows a vulnerability within the community that could cause problems when certain stressors impact the community. In the case of the BuurtGoenBedrijf, the presence of social and political capital helps the initiative establish and find support for projects. However, creating projects to adapt the living environment may also need financial capital, which is not guaranteed. Within KANT, political, financial, and social capital is present, which indicates that resources that support community resilience are present, but there is not necessarily abundant bridging contact with other organisations, initiatives, or communities. If a certain stressor impacts the community, help from other initiatives, (e.g., with innovative solutions, knowledge sharing and missing capitals) is missing, which could be seen as a vulnerability. In the case of the Tuinambassadeurs, there is financial capital and bridging social contact, but being initiated by the municipality makes it harder to create bonding networks. Furthermore, there is little political capital in the initiative, making it difficult to find support for certain ideas and causing a lack of ownership.

	KANT	BuurtGroenBedrijf	Tuinambassadeurs
Financial capital	<ul style="list-style-type: none"> - Financial capital available through funding from the municipality and water board - Social entrepreneurship available through the initiators - Dependency on the local governments 	<ul style="list-style-type: none"> - Financial capital available through paid assignments and project-based funding - Social entrepreneurship available because of initiators - Financial state does not guarantee continuity because of lacking structural funding 	<ul style="list-style-type: none"> - Financial capital available through funding from the municipality - Social entrepreneurship difficult due to a lack of ownership - Continuity not guaranteed due to missing social entrepreneurs and lack of municipal capacity
Political capital	<ul style="list-style-type: none"> - Political connections with civil servants and the city council - Involved in municipal plans, no collaboration in those plans 	<ul style="list-style-type: none"> - Has certain network connections with civil servants and municipal departments - Consulted about municipal plans, no collaboration in those plans - Collaboration with municipality with regard to neighbourhood level projects 	<ul style="list-style-type: none"> - Lack of political capital due to a standstill in contact - Lack of municipal capacity, contact is therefore difficult to maintain
Social capital	<ul style="list-style-type: none"> - Active group that knows how to interact with the community - Bonding network with the community through social media - Bridging network connections with other initiatives 	<ul style="list-style-type: none"> - Bonding network within the neighbourhood through activities - Bridging network with a range of organisations and initiatives through the living lab 	<ul style="list-style-type: none"> - Bonding network with the community missing due to a broad scope - Presence of bridging network with other initiatives within the municipality - Being initiated by the municipality makes it harder to create bonding networks

Table 7: Overview of capitals for each case

4.2. Knowledge and learning

Learning and knowledge are conditions in CBA and co-creation processes which create an understanding of the living environment. Creating community resilience requires creative, local, and expert knowledge from which actors can learn lessons, and in turn, they create effective and innovative resilience approaches (Ehlen et al. 2015). These actors should play a vital decision-making role in projects because they are the ones who need to be resilient and know the places of conflict and dissensus within the living environment (Kaika, 2012). To research if these kinds of knowledge indeed lead to a better understanding of the living environment and more efficient and innovative approaches for bolstering resilience, questions were asked about both practical experience with the initiative, and theoretical experience gained from backgrounds of active members, as well as through the bridging networks, as discussed in the social capital section.

Due to personal work experience, backgrounds, and networks, expert knowledge was acquired in all three studied cases, which helped with implementation of the initiatives through, for instance, previous collaboration with local governments or knowledge about which adaptation methods to use in the initiatives. With regard to the KANT initiative, the initiators are themselves experts in the field of climate adaptation and collaborate with municipalities due to their backgrounds. This also applies to the BuurtGoenBedrijf and the Tuinambassadeurs (Participants 1, 2, 6, 7, 9, 10). All of these initiatives have members who acquired knowledge through their work, background, and/or personal networks to help support their initiative. The Tuinambassadeurs, for example, were set up by the municipality with the help of nature organisations IVN and KNNV. From these clubs, members have stepped in to become Tuinambassadeurs. At the BuurtGoenBedrijf, the *Arnhem klimaatbestendig* platform provides contact with other organisations that help with transferring expert knowledge. Due to an active core of initiators, and by bridging relations, there is an exchange of expert knowledge present within the three cases.

“We also have a very nice platform in the neighbourhood, Arnhem klimaatbestendig, where a lot of information can be obtained and we also have a lot of information from practice that we can then give to that platform. So that’s a trade-off” (Participant 6).

While expert knowledge is related to theory, local knowledge focuses on available information from within the community, which could be gathered by practical experiences. In the case of KANT, these experiences lead to altering assumptions and therefore different approaches for projects.

“We also had the belief ourselves that 90% of the people in our village do not want to go along with our initiative. That belief turned out to be equally untrue. And that makes it such an educational process for us. It’s not just idealism, it’s also practical learning and experiencing” (Participant 1).

The BuurtGroenBedrijf, in collaboration with other initiatives within the Spijkerviertel, use an online poll (*Spijkerpeil*) to gather knowledge of what is occurring in the neighbourhood and can thus tap into citizens’ local knowledge (Participant 6). In the case of the Tuinambassadeurs, learning by joining projects of other initiatives to connect with the community leads to local knowledge gathering, although the broader scope and smaller network of the initiative makes this more difficult (Participants 9, 10).

Having both local and expert knowledge helps initiatives formulate proper responses concerning climate adaptation. Local knowledge is needed if an initiative wants to create value within the community. Not knowing what problems and knowledge are present within the community could lead to inefficient activities.

“When new plants are planted, poles and wire are normally placed around it by the municipality. In a neighbourhood like this that doesn’t work; animals walk underneath and do their business, a car hits the pole, someone pulls the wire, etc. We have offered an alternative, to weave willow twigs around it, which has many advantages” (Participant 6).

Expert knowledge helps the initiative by creating quality network relationships and helps with advising the community as well as other organisations:

“For example, there was a consultation of organisations that deal with climate adaptation and we were also invited there, and that commitment is also appreciated. We were also invited to a similar meeting on sustainability, and we were also invited to the Gouda environmental vision” (Participant 9).

For expert and local knowledge to be useful, creative knowledge used to design and implement efficient resilience approaches should be present. This type of knowledge is affected in the case of the Tuinambassadeurs because they did not initiate their own project and have established themselves as an implementer which provides advice to other projects and initiatives. As a result, knowledge is exchanged with others, but creative knowledge is lacking because they do not design their own projects. For both KANT and the BuurtGoenBedrijf, this type of knowledge is present, as they are the initiators of their projects and therefore formulate specific value creation and collaborate with public authorities to achieve goals. To do so, social entrepreneurs who drive change processes for the benefit of the community are needed (Lund, 2018). These entrepreneurs bring about creative knowledge by implementing effective value creations in the community.

“At the end of September there was an opportunity to get a number of large plants that were left over from a project and would go to the incinerator. The horticulturist wanted to give them as long as we didn't do any commercial activities with the plants. We picked up 250 plants and distributed them on a Saturday morning, and half an hour later we already had given them all away. I give this as an example of the spontaneity that is also in the actions” (Participant 1).

Due to the presence of creative knowledge and social entrepreneurship, KANT and the BuurtGoenBedrijf have an innovative approach, the BuurtGoenBedrijf by creating social contact in the neighbourhood by the use greening projects and KANT by formulating activities that follow up with previous ones, creating a constructive value (Participants 2, 6, 7). The initiatives learn from expert, local, and creative knowledge, while others also learn from this knowledge through the initiatives' bridging networks. KANT achieves this through their website and social media, the BuurtGoenBedrijf by working locally in the neighbourhood to involve and educate people, and the Tuinambassadeurs by joining other initiatives and helping with advice.

4.2.1. Synthesis

What emerged from the three cases, related to learning and knowledge, is the presence of expert knowledge. This is due to collaborations with other initiatives, organisations, and the municipality, but mainly due to the background of the initiators. These initiators often have a passion with regard to the subject, which comes from the person's field of work or from understanding the urgency of the problem. This expert knowledge is supplemented by local knowledge, which is easier to reach for the initiatives with a higher degree of bonding social capital. The initiatives with a lesser degree of social capital may find it harder to acquire knowledge. It should be noted that the active members of the initiatives are part of the community and therefore local knowledge is available,

even when bonding capital is lacking. With regard to sharing information, bridging social capital is important, meaning that relationships with other organisations ensure that learning from others is possible. In addition, a presence of creative knowledge and social entrepreneurship means that initiatives learn by doing and initiate innovative approaches to the issues at hand and therefore should be present in an initiative to devise innovative and effective solutions. Table 8 shows an overview of the discussed knowledge related conditions that prerequisite the building of community resilience.

	KANT	BuurtGroenBedrijf	Tuinambassadeurs
Local knowledge	- Gathered by practical experiences (e.g., activities in the community)	- Gathered by using polls in the neighbourhood (<i>Spijkerpeil</i>)	- Joining other projects and initiatives, and sharing knowledge with each other
Expert knowledge	- Through initiators, local government, contact with other initiatives.	- Through initiators, <i>Arnhem Klimaatbestendig</i> , <i>Circulair Spijkerkwartier</i>	- Through nature organisations (KNNV and IVN), active members, and the <i>Steenbreek</i> platform
Creative knowledge	- Initiators formulate specific value creation and could be seen as social entrepreneurs	- Initiators formulate specific value creation and could be seen as social entrepreneurs	- Lacking because the local government is the initiator and the initiative mostly implements activities together with other initiatives

Table 8: Overview of knowledge related conditions

4.3. Participation in decision-making process

For both CBA and co-creation, participation of the community within municipal plans could be either a driver or a barrier (Ehlen et al. 2015). To determine adaptation measures in the local setting, and for a municipality to understand what problems have priority within the community, participatory approaches are needed. To research if these approaches are being used in the case studies, questions were asked about whether and how the initiative and citizens were included by the municipality.

Concerning the municipality of Vught, there is a recognition that participating with citizens helps with understanding local contexts and leads to more efficient projects because both local and expert knowledge can be accumulated. The municipality of Vught therefore attempts to facilitate residents in their needs and listen to their input (Participants 1, 3, 5). Citizens think along about interventions in the public space, and if an idea comes from the community, the municipality assesses whether it is possible to facilitate.

“For instance, there was a big field without function and citizens asked if they could use it for creating a park. They designed that park while the municipality prepared the ground and gave advice about greenery and we bought the plants they wanted. Through ways like this, the municipality tries to stimulate and facilitate ideas of citizens” (Participant 3).

The effectiveness of KANT in adapting private space to climate change impacts has caused a change in approach by the municipality. Although KANT started recently, the municipality is discussing the possibility of their involvement in municipal plans rather than only consulting and facilitating the initiative. KANT was invited to contribute ideas to an urban heat plan for the municipality (Participant 1), and involvement in the development of new climate adaptation reports of the municipality is a possibility (Participants 3, 4, 5). Nevertheless, no real involvement in policies is present due to the short lifespan of the initiative, as well as the municipality having already formulated adaptation reports recently. Nevertheless, involvement in future policy reports is a probability.

“I think that in five years, an initiative like KANT will surely be invited by the municipality to help with complementing municipal plans as soon as a major plan comes up.” (Participant 5).

By making use of neighbourhood and district managers, the municipality of Arnhem creates a network with the community that can be used to participate in certain projects. The BuurtGroenBedrijf is also involved through this network in activities from the municipality in the Spijkerkwartier.

“I try to facilitate and also network within the organisation and to connect initiatives to the municipality. You could see me as the oil within certain processes and contacts” (Participant 8).

Because the scope of the initiative is at the neighbourhood level, it is not involved in city adaptation plans, but rather in plans at the neighbourhood level. For instance, the BuurtGoenBedrijf works together with the municipal maintenance team and provides input with regard to the climate-adaptive measures that can be taken in sewage renewal projects. The BuurtGoenBedrijf enters into discussions with residents in the neighbourhood so that residents have the same level of knowledge and are aware of the neighbourhood’s general interest. This knowledge of the BuurtGoenBedrijf creates value for the municipality and causes a positive drive to collaborate with the initiative on a neighbourhood scale (Participant 6, 7, 8). In this partnership, the municipality and the BuurtGoenBedrijf treat each other as equals, which is important for the process to work efficiently.

“And it is also important that you sit next to each other. You have to build trust, and that is ultimately a good basis for a collaboration” (Participant 6).

“I do think that it is important that you show such an initiative that you are working on the same line, that you therefore also stand next to the initiative and do not try to point out from the side-lines, but are much more based on collaboration” (Participant 8).

The process of creating solutions within the neighbourhood works because the municipality thinks not only of steps that the BuurtGoenBedrijf could take, but also of the steps that they could take within the organisation to help achieve the goals of the initiative (Participant 8).

The municipality of Gouda has adopted a consulting role with regard to citizen participation in adaptation processes due to citizens being invited to informational meetings, though no further involvement in the spatial planning process takes place. Due to a lack of capacity, the municipality

of Gouda attempts to stimulate civic initiatives through financial resources. This facilitating role helps initiatives but does not necessarily mean that these citizens participate actively throughout the planning process.

“Citizens know that you should not expect that the municipality of Gouda is funding initiatives, but to look at how you can organize things yourself. [...] At the same time, the municipality is trying to stimulate, for example through the Goudapot” (Participant 11).

Within municipal plans, the Tuinambassadeurs are mentioned as an initiative which works on climate adaptation in the municipal borders. With regard to participation between the Tuinambassadeurs and the municipality of Gouda, the initiative is invited for brainstorming sessions with the municipality. In addition, there is also consultation in which the municipality assesses how the initiative functions, but the contact with the municipality is tough and slow because of a lack of capacity in the government, and some ideas from the initiative are dismissed by the municipality because they do not exactly match the municipality’s plans.

“We had a consultation with three officials, and the conclusion was that the website we wanted to use as a platform was not intended for that. What we do is climate adaptation and the website is aimed at sustainability. We have the opinion that these things are related, and gradually the municipality starts to understand that, too” (Participant 9).

This hinders the freedom of the initiative to come up with creative ideas. Resources such as financial capital are facilitated, but the participation process with the municipality does not go beyond that (Participant 10). For the initiative to work more efficiently, the municipality should not only focus on a consulting role, but also involve the initiative more in decision making processes and to listen to them. Participant 11 indicates that the municipality should support the initiative more and that the initiative should be able to operate as part of the municipality, but this is difficult with the current capacity of the municipality.

Participation processes are present in all cases, but the role of the municipality in these partnerships differs. In the case of KANT, the municipality is trying to involve the initiative in their own plans to make use of their expertise and to know what is happening in the community. At the BuurtGroenBedrijf, the municipality has the capacity to appoint neighbourhood managers who act as mediators in a neighbourhood. This makes it possible for the municipality to collaborate closely with initiatives such as the BuurtGroenBedrijf. In the case of the Tuinambassadeurs, the municipality uses a consultative role in which they invite the initiative for brainstorming sessions, but otherwise not in policy creation. Contact is often difficult due to the low capacity of the municipality as a result of recent financial problems. To conclude, a match between roles is not apparent in practice due to problems with municipal capacity and size. To conclude, lacking participation could lead to ineffective role distributions.

4.4. Conditions for co-creation

To determine whether there is an effective role distribution in the three researched cases, it is important to know a municipality's stance in relation to participation. In addition, it is necessary to know the initiative's co-creation dimension (Voorberg et al, 2015) and whether the role distribution between the municipality and initiative is compatible. If this is not the case, the initiative and municipality are not co-creating because the role distribution creates a mismatch. The role distribution, related to Figure 4, could lead to the process of co-creation being either a driver or a barrier for adaptation initiatives. Furthermore, drivers and barriers like a sense of urgency and stimulating innovation and knowledge creation, influence whether there is an effective co-creation process. Although innovation, creative knowledge, and the existing networks within the initiatives have been described, urgency has not. Consequently, this section will first describe the sense of urgency in each case, following with an explanation of the roles.

4.4.1. Sense of urgency

Concerning climate change impacts, all initiatives feel a sense of urgency. To start an initiative or join one, this passion for preparing for the impact of climate change needs to be present because otherwise one would not start or join such an initiative.

“The way I see climate change more and more, and the more information I gather in my life, the more I now notice that it is actually the biggest crisis we are in” (Participant 1).

Although a shift is visible, few citizens share the same feeling of urgency as the members of the initiative, according to most participants (Participants 1, 2, 3, 6, 7, 9, and 10). However, this does not mean that citizens do not participate with the initiatives in adapting gardens, but it makes the tasks of the initiatives more difficult because a feeling of urgency needs to be created within the community. This is challenging because it involves creating behavioural and psychological changes, which can be done by using social media, local newspapers, and media, and by being present physically in the community.

“Well, what we hear from people is that they just find it easier to have those tiles in their garden. And that they understand that climate-adaptive would be better, but that they do not want to get rid of their convenience. So, the willingness is still quite small. [...] By no means for everyone, of course, that differs per resident” (Participant 10).

Concerning the municipalities, the urgency of climate adaptation and the importance of the initiative differs. All the municipalities take climate adaptation measures into account when other spatial interventions are being planned and have adaptation reports. However, not all municipalities act proactively to implement adaptation measures.

“Climate adaptation is a program of the municipality of Arnhem, but it is not yet a guiding principle in policy. That is also an enormous customisation and that also takes time” (Participant 8).

For an effective co-creation process, a sense of urgency needs to be present in all participating actors. With regard to the three researched initiatives, this is present. However, local governments miss an integral adaptation approach, which could indicate that climate adaptation does not have a high priority. Because the municipalities have climate adaptation reports, urgency is present to a certain extent, thus being a driver for the co-creation process.

4.4.2. Role distribution

To understand whether there is a co-creation process, the role of the initiatives is explained in this section. For the KANT initiative, its role is that of a co-initiator. The municipality of Vught funds the initiative, helps with communication platforms, and thinks along with the initiative, but the initiative is not initiated by this municipality and launched projects are designed by the initiative itself. Hence, the initiative is the co-initiator and formulates specific value creations for the community.

“In the Netherlands, we are money driven. And one of our designed activities was giving away plants for free. Free and Dutch is a perfect combination, so these plants were sold out within half an hour” (Participant 2).

The BuurtGroenBedrijf was founded by active members who develop activities within the neighbourhood and, through the network of the neighbourhood manager, seek collaborations with departments that can help realise these activities. The municipality supports and helps the initiative to conduct these activities. Therefore, the role of co-initiator is also present at the BuurtGroenBedrijf.

For the Tuinambassadeurs, the role distribution is different from the other cases. The municipality asks the initiative for consultation and is the initiator of the Tuinambassadeurs, while the initiative designs and implements the approach. Hence, the initiative fulfils the role of co-designer. The initiative is requested for brainstorming sessions, but otherwise it does not influence municipal plans. Compared to the other municipalities, the municipality of Gouda has a lower sense of urgency for the local initiative, which also affects the extent to which they help the Tuinambassadeurs. Although the initiative determines what kind of projects they join or create, the initiator of the project is the municipality.

“The person from the municipality who came up with the idea for the Tuinambassadeurs has stopped and her successor has been specifically instructed not to go into implementation too much, but to look at matters much more policy-wise. Anyway, for now it means that the Tuinambassadeurs do not have the highest priority” (Participant 11).

The distribution of roles between the municipality and the Tuinambassadeurs in this case is therefore incompatible. Because there is a lower degree of urgency within the municipality for the initiative, and the municipality is not prepared to involve the Tuinambassadeurs more in municipal plans, there is too little support for the initiative.

4.4.3. Synthesis

Figure 4 shows the roles of both the initiative and the municipality in all of the cases. Furthermore, the compatibility of roles is made clear. The role distribution between the municipality of Arnhem and the BuurtGroenBedrijf creates a compatible co-creation process. In the case of KANT, the municipality of Vught has started to involve the initiative in municipal plans and supports the initiative with different kinds of capital. There is no co-creation, however, as incorporation of the advice and recommendations into the decisions is not happening. Due to this, incompatibility between roles leads to ineffective co-creation, which could be solved by the municipality aiming to use another participation approach that is compatible. In the case of the Tuinambassadeurs and their role distribution with the municipality of Gouda, the process is incompatible for two reasons. The capacity of the municipality is low, and their sense of urgency concerning climate adaptation is lower compared to the Tuinambassadeurs, meaning that communication and cooperation are difficult because of climate adaptation being a lower priority for the municipality. Because of the incompatibility, co-creation is not obtainable because the municipality should participate more with the initiative for there to be a co-creation process.

To conclude, a compatible role distribution can lead to a co-creation process. When a sense of urgency is apparent in all actors, the capacity of the municipality is abundant, and conditions for community resilience are available, the combination between compatible roles and these conditions creates support for the creation of community resilience.

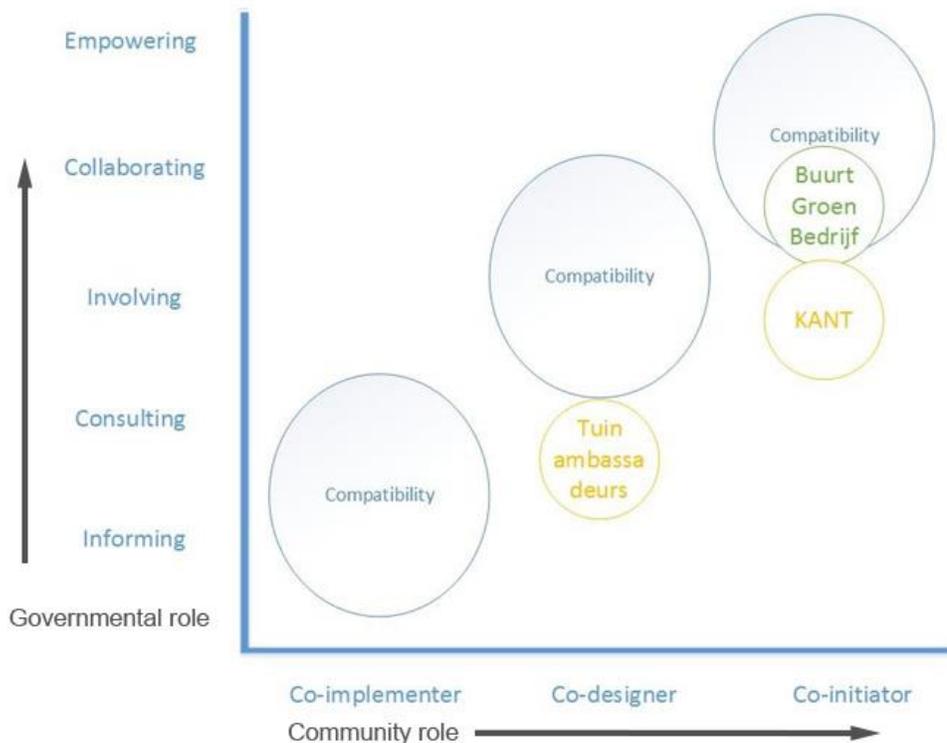


Figure 4: Overview of the roles related to the three cases.

4.5. Capacities

Socio-ecological resilience consists of resilience, adaptability, and transformability (Walker, 2004). These aspects are related to absorptive, adaptive, and transformative capacities, which are interconnected and reinforce each other. All are thus needed for communities to become resilient (Jeans et al. 2017). Creating these capacities is a process and takes time, meaning that trying to understand whether the conditions for these capacities eventually lead to resilient communities is only possible when research at other moments of time is conducted as well. Nevertheless, it is possible to research indicators for the presence of these capacities.

In the case of KANT and the BuurtGroenBedrijf, absorptive capacity is created through community-building activities and by the presence of financial, political, and social capital (see Table 7). In the case of the Tuinambassadeurs, financial and social capital is available, whereas political capital lacks due to the capacity of the municipality. Furthermore, the initiatives are making progress through their activities by implementing green in their living environment to better tolerate shocks such as a hotter summer. The cases related municipalities have created climate adaptation reports and physical interventions (e.g., a separated sewage system, greener public space, permeable parking space) and there is capital and knowledge available to tackle problems concerning climate adaptation. Thus, municipalities are implementing climate adaptation plans for the public space, while the initiatives focus on private space. Absorptive capacity is therefore built because both the municipalities and the initiatives implement buffers against climate change. Still, it should be noted that the initiatives do not implement solutions at the municipal scale because the scope is mostly aimed at neighbourhoods or streets.

"We have already come a long way in Vught because in principle we already have a separate sewage system, helping with flooding problems. When it comes to heat, for instance, we are dependent on initiatives such as KANT and it is great that they are active. They have a better chance persuading citizens compared to a municipality. When the municipality approaches them, it is quickly seen as imposing restrictions" (Participant 5).

Adaptive capacity can be created through awareness of climate adaptation in the community, causing people to be prepared to actually adapt their living environment. The initiatives all focus on this by persuading people, debunking prejudices about green gardens (e.g., takes too much effort, too expensive), and by implementing adaptation measures in the living environment. This influences the mindset of citizens to adapt their garden to collect more water and manage urban heat stress. Although this happens more effectively in some cases compared to others, there is adaptive capacity to a small extent in all three cases. The BuurtGroenBedrijf and KANT initiatives have created their own social capital networks with which they collaborate, have found ways to adapt the physical environment, and have become a household name in their local environment, thereby strengthening the community's adaptive capacity. The Tuinambassadeurs have a smaller bonding social network because the scope of the initiative is city-wide, making it more difficult to build quality relationships with citizens. However, creating capacity is a long-term process. The

initiatives are therefore progressing towards the creation of adaptive capacity, but this is not yet the case in practice because awareness creation takes time.

"We are now also structurally present on the street. On the one hand, this is because the municipality's major maintenance is now taking place, and on the other hand we have many activities ourselves. And that ultimately ensures the behavioural change that we want to create in the neighbourhood because people see that taking control over the quality of the living environment is possible and fun" (Participant 6).

Transformative capacity is needed for resilience creation because the types of capacities are interrelated (Jeans et al. 2017). For instance, without adaptive capacity, transformation cannot take place because transformation relates to creating new stable environments by introducing new ways of living, thereby changing the variables that define the living environment (Walker et al. 2004). Relating to the cases, there is no transformative capacity because this would mean that climate adaptation would be because of a lacking cultural shift with regard to climate change impacts in the communities.

"And an organisation such as a municipality is quite clustered, and still works with separated funding and all that kind of things. And integral questions such as climate adaptation that often arise from the community struggle because of this separation. So when it comes to making the municipality resilient, I think that as a district manager I am more concerned with making the organisation more resilient, so that eventually I can better collaborate with initiatives such as the BuurtGroenBedrijf." (Participant 8).

Transformation focuses on creating a new system, which would mean that local changes alone are not enough. Due to this, adaptation should be the integral priority in policies of governments on all scales to create a national shift concerning climate resilience. This is not the case because municipal organisations consist of departments and it is therefore difficult to create an integrated approach with climate adaptation as the highest priority. Because the Tuinambassadeurs are part of *Operatie Steenbreek*, a national campaign to create awareness for climate adaptation, this initiative would in theory contribute the most to transformative capacity. However, the semi-structured interviews revealed that it is difficult for municipalities to approach citizens regarding adapting their garden. The approach of *Steenbreek* is that municipalities join the national campaign and then design an approach with the help of citizens (i.e., co-designing). This makes approaching citizens difficult, due to the municipality being the initiators, making people less likely to listen.

"The nationwide focus of Steenbreek naturally helps to raise awareness. But the tricky thing about it is that there it is quite difficult for a municipality to make citizens change their gardens. You can of course come up with subsidies to get tiles out, but that all costs money while there are plenty of other challenges in public space" (Participant 11).

To conclude, while adaptive and absorptive capacity are present to a certain extent, transformative capacity is missing. This is caused by the absence of urgency on all governmental

levels related to climate adaptation, meaning that all governmental levels should help steer climate adaptation approaches towards a more radical transformation. In addition, awareness on a national scale instead of only a community scale is necessary. Table 9 summarises the results gathered through semi structured interviews. This is helpful for discussing them in relation to the theory.

4.6. Overview of results

	KANT	BuurtGroenBedrijf	Tuinambassadeurs
Financial capital	Through funding from municipality and water board	Through paid assignments and project-based funding	Through funding from the municipality
Political capital	Connections with civil servants and the city council	Network connections with civil servants and municipal departments	Lack of political capital due to low capacity of municipality and difficulties with contact
Social capital	Bonding network through social media, bridging network with other initiatives	Bonding network through activities, bridging network through living lab	Bonding networks lacking, bridging network with other initiatives in the municipality
Social entrepreneurship	Social entrepreneurship available through the initiators	Social entrepreneurship available because of initiators	Social entrepreneurship lacking due to missing ownership feelings
Local knowledge	Gathered by practical experiences.	Gathered by using polls in the neighbourhood	Joining other projects and sharing knowledge with them
Expert knowledge	Through initiators, local government, contact with other initiatives.	Through initiators, living lab, Circulair Spijkerviertel	Through nature organisations (KNNV and IVN), active members, and the Steenbreek platform
Creative knowledge	Initiators formulate specific value creation and could be seen as social entrepreneurs	Initiators formulate specific value creation and could be seen as social entrepreneurs	Lacking because the local government is the initiator and the initiative mostly designs activities together with other initiatives
Urgency	The initiative and municipality do have a sense of urgency but this urgency is less apparent the community	The initiative does have a sense of urgency and the governmental organisation shares in this urgency	The initiative does have a sense of urgency but this is less apparent in the local government and community
Role of local government	Involving citizens in governmental policies	Collaborating with civic initiatives	Consulting citizens for governmental policies
Role of initiative	Co-initiator	Co-initiator	Co-designer
Absorptive capacity	Created through adaptation activities and by the presence of financial, political, and social capital	Created through community-building activities and by the presence of financial, political, and social capital	Financial and social capital is present, helping with community-building activities that create absorptive capacity, whereas political capital lacks due to the capacity of the municipality.
Adaptive capacity	Creating awareness by debunking prejudices about green gardens through social media	Creating awareness in their neighbourhood by activities in the living environment and sharing knowledge	Creating awareness in the community by advising and helping citizens to adapt their gardens
Transformative capacity	X	x	x

Table 9: Overview of results

5. Discussion and conclusion

This chapter explains how the results relate to the theoretical framework and academic literature, to what extent results are generalisable to other contexts, and why they are valuable for planning practice. By answering the main research question, a conclusion is drawn about how condition of CBA and co-creation support communities in the Netherlands to become more resilient.

5.1. Discussion

This study aimed to gain a better understanding of how co-creation and community-based adaptation support the creation of resilient communities. Understanding this can provide lessons for both civic initiatives and local governments in how to deal with climate adaptation via co-creation, and which conditions should be taken into account for an effective approach. It has been argued that researchers need to move away from examining the nature of resilience and instead should shift towards accelerating learning about fostering resilience in practice (Fazey et al., 2018).

The assumption was, based on the theoretical framework, that identifying conditions and analysing how these conditions relate to adaptation initiatives could create an overview of supporting conditions for bolstering community resilience. In short, the hypothesis was that by participating with local governments, civic initiatives can obtain financial, political, and social capital. Compatible roles in the participation process could lead to co-creation which helps to actively involve actors in value creation. Combining the capitals with creative, local, and expert knowledge helps communities with the creation of innovative solutions for climate change impacts (e.g., urban heat island, pluvial flooding). These solutions can help a community with the building of capacity.

5.1.1. Connection with literature

The results of this research are to some extent consistent with the conditions from Chapter 2. The presence of capital supports initiatives with building capacity (Mauerhofer, 2013), and co-creation between communities and local governments can create intensive involvement in adaptation responses and collective resource contribution, which helps both parties to become more resilient (Sarzynski, 2015). However, some conditions were more important than previously thought. Social capital was thought to supplement other types of capitals to help produce better outcomes (Carroll, 2001), but the results also showed that social capital and knowledge gathering are interrelated, meaning that these conditions influence each other. This was also true for political capital and the capacity of the local governments. These conditions are therefore more important because an absence of one of the conditions influences the other, causing a bigger impact on the adaptation initiatives. Furthermore, some conditions were not included in the theoretical framework while being paramount for supporting initiatives aimed at adaptation. Local contexts like the size and capacity of the municipality relate to the degree of which a municipality can support an initiative, affecting the compatibility of roles. Moreover, social entrepreneurs are

needed for starting initiatives and designing innovative solutions. This was indicated in the theory by Ratten and Welppe (2011), but the results showed the importance of this condition, which was not included in the operationalisation of Chapter 2, was underestimated. Compatibility seemed to impact the effectiveness of available conditions because the co-creation process related to this compatibility creates a connection between the initiative and municipality which can be used for sharing capital and knowledge (Mfitumukiza et al. 2020). To conclude, conditions that derived from the case studies should be included in the theoretical framework that can help support adaptation initiatives. Size and capacity of the municipality and social entrepreneurship were not included, but are paramount for the support of initiatives because municipal capacity influences the compatibility of roles, and social entrepreneurs help with initiating projects and creating value.

5.1.2. Supporting conditions for effective CBA and co-creation

From the conceptual model, it emerged that financial, social, and political capital from the municipality and the community is necessary to effectively support an initiative. Learning, knowledge, and participation processes are equally important because lessons can be learned from both practice and theory (Voorberg et al. 2015., Twigger-Ross et al. 2015., Fazey et al. 2018). These conditions can lead to the building of absorptive, adaptive, and transformative capacity through co-creation and CBA (Walker, 2004). However, these theory-based conditions do not fully explain which conditions support effective CBA and co-creation. The results showed that conditions not mentioned in the theoretical framework play an important role in supporting communities as well. The size and capacity of a local government influences the availability of capitals, thus being an important prerequisite for capacity building. Furthermore, social entrepreneurship encouraged the creation of innovative solutions for problems, for instance by finding alternative ways of financing.

In addition, the results showed that some conditions are interrelated. The presence of political capital appeared to be influenced by the size and capacity of the local government. Lacking government capacity causes difficulties for initiatives in contacting the municipality. Furthermore, a smaller governmental organisation means that connections with the city council are easier to make, while a bigger municipality with capacity has more options for hiring civil servants that collaborate closely with initiatives, thus creating political capital. In addition, social capital and the gathering knowledge seemed interconnected as well. Bonding social capital ensured connections with the community causing that local knowledge could be shared. Bridging social capital related to the gathering of expert knowledge because connections with external relations (e.g., the relationship between the Tuinambassadeurs and the *Operatie Steenbreek* platform) meant that expert knowledge was shared. Furthermore, the proactive attitude of social entrepreneurs in combination with creative knowledge facilitated value creation in the living environment. Financial capital is needed for civic initiatives in order to implement adaptation projects. While the results showed that financial capital was important for the initiatives, an incompatible role distribution between the initiative and local government could mitigate the positive effect of abundant financial capital.

5.1.3. Implementation of CBA approaches

For an adaptation initiative to implement a CBA approach, it is important that it focuses on both the social and ecological side of the problem. Socio-ecological systems are intertwined (Folke et al. 2010), meaning that not only ecological problems like urban heat, but also social factors in the local contexts (e.g., creating social cohesion) should be included in an initiatives' approach. Community-based adaptation takes priorities of the community into account, meaning that not only adaptation, but other priorities as well need to be included in the approach of initiatives. Priorities of communities focus not only on climate adaptation but also on social problems in the community (Reid et al. 2009). Linking these problems thus ensures an effective approach to multiple problems, because the sense of urgency for these problems is combined.

In the studied cases, it became clear that linking social and ecological problems did not always happen. Initiatives start from a passion or a sense of urgency for adaptation, by a relatively small group of citizens. This results in the initiatives only focusing on the topic for which their sense of urgency or passion is aimed at. An important task for initiatives lies with creating awareness within the rest of the community. This can be done through information campaigns and actively contributing to improving the living environment, but the best way is to link other neighbourhood problems so that more citizens are involved in an initiative and awareness is created for both problems. This was reflected in the initiative of the BuurtGroenBedrijf. This initiative created low-threshold activities in the neighbourhood to improve the living environment, not only in the field of climate adaptation and resilience, but also in the field of social cohesion (e.g., combining the creation of façade gardens with cleaning up the street and an eating activity afterwards). Citizens with different priorities were connected this way, and both a social and ecological problems (e.g., a lack of social cohesion, dirty streets and the need for adaptation) within the neighbourhood were addressed.

To conclude, CBA focuses not only on adapting the living environment to the impact of climate change, but also on underlying problems in the community such as a lack of social cohesion or a missing sense of urgency. Therefore, initiatives in the Netherlands should try to include other development issues that are important for citizens to create a joint approach and increase awareness of both problems.

5.1.4. Distribution of roles in the co-creation process

Voorberg et al. (2015) describe co-implementing not as part of co-creation but as co-production. Due to this, no co-implementing case has been researched. With regard to co-initiating, active collaboration of local governments allowed the initiatives to acquire capitals and create value. Furthermore, even when a certain capital was lacking, compatibility of roles still caused effective value creation in the living environment and is therefore paramount for adaptation projects. Concerning the co-design dimension, municipalities should aim to use a proactive participation role because they initiated, and ownership therefore rests with them. This can be done by participating next to, instead of with initiatives, and treating them as equals. The results do not necessarily reveal whether co-designing or co-initiating is more effective, but do show that a

compatible role distribution influences the effectiveness of an initiative. The presence of capital does not necessarily support effective adaptation approaches if an incompatible co-creation process is used. What this means is that if local governments want to help the initiatives as effectively as possible, they have to take into account that the compatibility of roles, next to the presence of capital, is an important condition.

5.1.5. Generalisability to other contexts

The results from this study can be generalised to a limited extent with regard to application in other countries because of the political trend in the Netherlands towards a participation society (*participatiesamenleving* in Dutch), meaning that citizens and local municipalities in the Netherlands are steered to actively participate (PBL & Hajer, 2011). This research is in line with this trend because it focuses on co-creation between civic initiatives and local governments. In other countries, governments may not have this trend for active participation, making it more difficult to apply the conditions discussed in this thesis. Therefore, certain contexts should be taken into account, such as the vision and culture within a national government, as well as differences in priority within that government. These context dependent factors can lead to difficulties concerning the functioning of the discussed conditions. In addition, the presence of some conditions in the Netherlands, such as financial capital, may be less evident in other countries. Initiatives in the Netherlands can approach the municipality for money, while initiatives in other countries may not have this luxury. As a result, it must be taken into account that conditions that emerged as of lesser importance in the cases, may be more important in other countries.

The framework of conditions can be used as a diagnostic tool for other adaptation initiatives to check which conditions are missing and where the strengths and weaknesses of initiatives lie. Here too, the research can only be generalised to a limited extent because local contexts, such as the capacity and size of a municipality, can act as a driver or barrier and should be taken in account. These local contexts can influence the importance of specific conditions, thus creating a different outcome. Nevertheless, with the conditions of both theory and the research in mind, initiatives in other local contexts can still prepare for the creation of community resilience.

With regard to initiatives that are not aimed at adaptation, the research is less applicable. These initiatives can still take the different conditions in accounts which are applicable for other subjects (e.g., capital, learning, participation) in account. However, some of these conditions (e.g., adaptive capacity) are poorly applicable due to the conditions being tested for adaptation initiatives. Whether these conditions are also paramount for other subjects (e.g., initiatives aimed at local food production or healthcare) did not become clear in this thesis because the scope of the research did not cover them.

5.2. Conclusion

This section answers the main question: *“How can community-based adaptation and co-creation support communities in the Netherlands to become more resilient to climate change?”*.

According to the results, the civic initiatives in this multiple case study take a proactive role in implementing climate adaptation in the municipality. The municipalities stimulate the initiatives by providing resources including financial and political capital and consulting with the initiatives for advice on related topics. What is missing is a more collaborative stance on the part of the local governments, in which the initiatives are more included in the adaptation plans of municipalities and have influence on these plans. This is especially important due to the upcoming Environment and Planning Act (*Omgevingswet*) implementation deadline, which aims to steer governments towards active participation with citizens.

Based on the conceptual model, a process of creating support for resilient communities is explained which was tested through the case studies. This process involves capital being available through the community, local governments, and other actors. This capital can be gathered through participation processes which are formed by a distribution of roles and, when compatible, lead to a co-creation process between the local government and community. Learning, knowledge, and participation processes need to occur to create an environment where this co-creation process works effectively, while CBA helps the community to cope with upcoming stressor from climate change impacts that they prepared for (e.g., flooding, urban heat, loss of biodiversity). By using these approaches, supporting conditions for community resilience can be gathered and capacity building could be enhanced. Furthermore, this process is influenced by contextual conditions such as a presence of social entrepreneurs, the size and capacity of the local government, and a sense of urgency in all actors and at all governmental scales.

The presence of the conditions offers the potential to create resilient communities. However, this process takes time. Moreover, the presence of all the conditions does not necessarily lead to resilient communities because contextual conditions such as a presence of social entrepreneurs, the size and capacity of the local government, the policies of national and regional governments, and the communities' perception of urgency, influence community resilience for climate change impacts as well. Furthermore, in all cases, transformative capacity was missing, which could be caused by the lack of a high priority for adaptation at national, regional and local scale. To conclude, using conditions from the theoretical framework to support community resilience positively affects the process, but other factors including institutional contexts, social entrepreneurship, capacity and size of local governments, and urgency on all scale levels influence the effectivity of this process as well.

5.3. Recommendations for planning theory and practice

This thesis explained conditions within planning theory that support community resilience. In addition to the conditions arising from the theory, capacity of the municipality, regional and national contexts, urgency, and social entrepreneurship were also important factors that should be included in theoretical frameworks. The cases showed that the presence of these conditions had potential for community resilience, but that transformative capacity was lacking in all cases. This is because transformative capacity has a broader scope than the local context. Nevertheless, this capacity is important for creating community resilience because the capacities are interrelated. To solve this, more research should be conducted on transformative capacity and how it can be gathered in practice by studying cases which focus on transformative capacity building.

With regard to planning practice, it is important for planners that the distribution of roles in the local context is well understood and aligned. In addition, the planner must recognise that ownership should be given to initiatives by providing capital without setting too many requirements. This is important because it supports the creative knowledge processes and social entrepreneurship which are needed for community resilience. Finally, due to the upcoming Environment and Planning Act, local authorities in the Netherlands should aim to show more decisiveness in partnerships with initiatives by involving these initiatives and giving them a say in their plans. This way, expertise and local knowledge can be used by both parties.

5.4. Reflection

In this last part of my thesis, I reflect on the process from start to finish. The thesis was consistently worked on by means of a monthly appointment. In the beginning, there was a setback due to Covid-19, which meant that the first proposal had to be overhauled because the research could not take place properly. However, this was resolved in a timely manner. Developing the theoretical framework was initially difficult, but after the first version, the revision of this part of the thesis went smoothly. Finding relevant cases to investigate, however, was more challenging because not only adaptation cases had to be sought, but also cases in which the initiative and the government work together. However, when these cases were found, it was easy to find participants and to conduct follow-up interviews by means of the snowball method. A limitation to the interviews, however, was that they were held online, which sometimes made the conversations less smooth due to poor internet connections or missing body language. In addition, it was sometimes difficult to manage the conversation or elicit a precise answer. A point of reflection is that the questions asked during the interviews changed slightly during the research, which may have affected some of the interview results. This was inevitable, as it was a process of learning by doing, and every interview provided new insights that served as input for the next. Furthermore, interviewing more people within the municipalities would have been interesting to research how the municipality in general dealt with participation and co-creation, but that was not feasible within the scope of this study.

A limitation of this research with regard to the validity of the data is that role distributions are difficult to research because a municipality is an organisation with different departments which do not necessarily work in the same way. Therefore, departments may differ in how they collaborate with initiatives and certain roles may vary between departments. Certain actions of governments and initiatives could point at a specific role, while other actions juxtaposed these roles. Another limitation of this thesis is that contextual influences from other governmental scales (e.g., governmental view towards climate change, support for local governments, priorities of regional and national governments) were not taken into account although they are important for this research. The strength of this research is that it examined multiple cases in the Netherlands, thereby revealing differences between municipalities and providing possible explanations for differences.

With regard to reliability, more participants were interviewed in the case of KANT when compared to the BuurtGroenBedrijf and the Tuinambassadeurs. This was due to the availability of participants. This reliability issue does not have an impact on the quality of the conclusion because for each case saturation of information was achieved. Furthermore, the difference of the initiatives' age was not taken into account. The KANT initiative only existed half a year, meaning that building adaptive capacity was not possible because that is a long-term process. A last issue with reliability is that no case where the initiative functioned as a co-implementer was researched. This was the initial idea, but the roles of the initiative and municipality were only clear until after conducting interviews.

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7. Appendixes

Appendix I: Code scheme

Code group	(Deductive) Code	(Inductive) Code
Capacities	<i>Absorptive capacity</i>	<i>Examples of projects</i>
	<i>Adaptive capacity</i>	<i>Tackling underlying problem</i>
	<i>Transformative capacity</i>	
Learning	<i>Local knowledge</i>	
	<i>Expert knowledge</i>	<i>Role distribution</i>
	<i>Creative knowledge</i>	<i>Entrepreneurship</i>
Participation	<i>Compatibility with participation</i>	<i>Trust</i>
	<i>Clear incentives for participation</i>	<i>Responsibility</i>
	<i>Feeling of ownership</i>	<i>Dependency</i>
Capital	<i>Social capital</i>	
	<i>Financial capital</i>	<i>Continuity</i>
	<i>Political capital</i>	<i>Decisiveness</i>
Community-Based Adaptation	<i>Community</i>	<i>Inequality</i>
Co-creation	<i>Collaboration</i>	<i>Positive and negative aspects of collaboration</i>
	<i>Urgency</i>	<i>Pro-active or reactive</i>

Appendix II: Letter of consent

Letter of consent

Datum: _____

Geachte heer/mevrouw,

Bij deze wil ik u alvast bedanken voor uw bereidheid om deel te nemen aan mijn afstudeeronderzoek. Het onderzoek voor mijn masterthesis gaat over hoe gemeenschappen zichzelf resiliënt (of veerkrachtig) kunnen maken tegen de impact van klimaatverandering en hoe co-creatie (of samenwerking) met lokale overheden hierbij een rol speelt.

In dit interview worden vragen gesteld over hoe u als burgerinitiatief/gemeente bijdraagt aan het veerkrachtig maken van uw omgeving, en hoe de samenwerking verloopt met andere partijen. De vragen zullen op een semigestructureerde manier gesteld worden, zodat bepaalde onderdelen eventueel extra aandacht kunnen krijgen tijdens het gesprek. Het interview zal ongeveer 40 minuten duren.

Door middel van dit formulier vraag ik uw toestemming voor het opnemen van dit interview. De geluidsopname zal alleen als hulpmiddel gebruikt worden bij de verwerking van het interview en zal daarna worden verwijderd. Het transcript van het interview kan nadien, ter goedkeuring, aan u verstrekt worden.

Ten slotte wil ik u op de volgende punten wijzen:

- Dit interview kunt u op elk gewenst moment onderbreken of stoppen;
- Uw gegevens worden vertrouwelijk behandeld en zullen uitsluitend gebruikt worden voor dit afstudeeronderzoek;
- Uw deelname aan dit interview kan, indien gewenst, geanonimiseerd worden.

Bij verdere vragen kunt u contact opnemen via onderstaande gegevens.

Met vriendelijke groeten,

Jouke Feenstra
j.feenstra.4@student.rug.nl
Master student Environmental and Infrastructure Planning
Rijksuniversiteit Groningen.

Naam: _____

Handtekening: _____

Appendix III: Interview guides (in Dutch)

Interview guide municipality

Introductie case

-Kunt u zich voorstellen en uitleggen wat uw rol is bij de gemeente ...?

Capacities

-Wat voor maatregelen voert de gemeente uit met betrekking tot het veerkrachtig maken van de gemeente tegen klimaatverandering?

-Welke maatregelen worden er in de gemeente genomen om burgerparticipatie en burgerinitiatieven te stimuleren op het gebied van klimaatadaptatie?

Operatie Steenbreek (alleen voor case Gouda)

-Waarom heeft de gemeente gekozen om zich aan te sluiten bij operatie Steenbreek?

-Hoe ziet dat project er binnen de gemeente precies uit?

Hoe is dat precies opgebouwd?

Welke taken voert het initiatief allemaal uit in gemeentelijke grenzen?

-Wat zijn de voor en nadelen van zo'n landelijke campagne ten opzichte van het steunen van een lokaal initiatief?

Kennis

Hoe komen jullie aan de kennis op het gebied van klimaatadaptatie en bestaat dit alleen uit expertise of ook uit lokale kennis?

Capital

-Hoe ziet het samenwerkingsverband tussen de gemeente en Het initiatief eruit?

-Wat zijn de plus en minpunten van dit samenwerkingsverband? Wat levert het op maar ook wat mist er in de samenwerking?

-Hoe daadkrachtig is de gemeente en het initiatief zelf in dit samenwerkingsverband en in het uitvoeren van projecten?

(Wat doen jullie allemaal daadwerkelijk?)

-Helpen jullie het initiatief ook mee met financiering? Hoe doen jullie dit bij andere initiatieven?

-Heeft het initiatief ook voeten in aarde bij bewoners in de gemeente. (Naamsbekendheid en actieve betrokken burgers etc.?)

-Hoe zit het met de continuïteit van het initiatief, is het in de toekomst nog actief denkt u?

-Is er ook sprake van veel politieke belangstelling in het initiatief?

Rollenverdeling

-Welke rol heeft het initiatief aan de ene kant en de gemeente aan de andere kant binnen het samenwerkingsverband?

*-Heeft de gemeente meegeholpen met de **uitvoering, het ontwikkelen van oplossingen of het oprichten van het project?***

-Zouden je/u de samenwerking met het initiatief omschrijven als reactief of proactief?

Wat ik daarmee bedoel is, Als het initiatief iets nodig heeft en ze benaderen jullie helpen jullie ze dan, of helpen jullie ze ook als jullie als gemeente zelf ideeën hebben waarbij het initiatief wellicht een oplossing kan zijn.

-Zijn de gemeente en het initiatief ook afhankelijk van elkaar? Hoe uit zich dat?

Urgentie

-Zien jullie als gemeente ook de urgentie van de samenwerking met lokale burgerinitiatieven op het gebied van klimaatadaptatie?

Participatie

-Heeft het initiatief ook verantwoordelijkheid over bepaalde taken in de gemeente?

-Betrekken jullie het initiatief ook in jullie eigen beleid?

-Hebben ze bijvoorbeeld ook inspraak in gemeentelijke plannen m.b.t. klimaat adaptatie?

-Vindt u dat er sprake is van een goede vertrouwensband tussen het initiatief en de gemeente?

-Werken gemeentelijke initiatieven net zo goed als lokale initiatieven die echt opgezet zijn door burgers?

-wat zijn plus en minpunten van die 2 verschillende werkvormen.

-Is de gemeente ook al bezig met de omgevingswet en op zou een lokaal groen initiatief daar ook in thuis passen?

-Wat zijn de plus en minpunten van dit samenwerkingsverband? Wat levert het op maar ook wat mist er in de samenwerking?

Outro

Interview guide initiative

Introductie case

- Kunt u zich voorstellen en uitleggen wat uw rol is bij het initiatief?
- Hoe is het initiatief opgericht?
- Hoe gaat het met het behalen van de doelen van het initiatief?

Community

- Is er ook sprake van een gemeenschap (community) binnen jullie initiatief. (Locatie, mensen, zelfde interesse)
Hoe is die gemeenschap vormgegeven? Komen jullie ook samen en hoe hebben jullie contact met elkaar?

Betrekken van personen of partijen

- Hoe zorgen jullie ervoor dat andere mensen ook mee willen doen aan het initiatief?
-En op wat voor manier zou dit mee kunnen helpen om een soort cultuur shift OMSLAG te creëren m.b.t. het groener maken van tuinen?

Capacities

- Hoe flexibel zijn bewoners in het veerkrachtig maken van hun gemeente?
*Zijn mensen veel mensen bereid hun tuin te vergroenen?
Hebben ze de kennis en het geld ervoor om dit te doen?*

Capital

- Hoe wordt het initiatief gefinancierd?
Zijn jullie ook afhankelijk van subsidies of kunnen jullie op eigen benen staan?
- Is er in de gemeente ook veel politieke belangstelling in de onderwerpen die jullie als initiatief aanstippen?
Hoe uit zich dat dan?

Kennis

- Hoe zijn jullie aan de informatie en kennis gekomen om dit project op te zetten.
*Gebruiken jullie zowel **lokale kennis** van leden of initiatiefnemers als kennis van overheden of **experts** op het gebied van klimaatadaptatie?*

Urgentie

- Zien de bewoners in de gemeente ook de urgentie om deze problemen aan te pakken en is dit voor de gemeente ... ook het geval?
Hoe creëren jullie bewustzijn binnen de gemeenschap voor de problematiek rondom de gevolgen van klimaatverandering?

Achterliggende problematiek aanpakken

-Wordt er door het initiatief ook nagedacht over waarom mensen überhaupt veel tegels in hun tuin hebben, en werken jullie aan een oplossing voor dit onderliggende probleem?

Je zou bijvoorbeeld met tuinders in gesprek kunnen gaan zodat die mensen erop kunnen wijzen etc. Of op scholen lesgeven over het onderwerp om zo kinderen bewust te maken.

Samenwerken met lokale overheden

-Wordt er vanuit de lokale overheden zoals het waterschap of de gemeente ook beleid gevoerd om jullie bij te staan of te helpen? (*Bijv. met subsidies, zelf aansluitend beleid voeren, informatie delen etc.?*)

-Is de gemeente ook daadkrachtig in deze samenwerking?

-Met wie werken jullie allemaal nog meer samen?

Rollenverdeling

-Welke rol heeft jullie initiatief aan de ene kant en de lokale overheden aan de andere kant binnen het samenwerkingsverband?

-Hebben jullie/gemeente meegeholpen met de uitvoering, het ontwikkelen van oplossingen of het oprichten van het project?

-Wat zijn de positieve en de negatieve punten in zo'n samenwerkingsvorm? Wat vindt u bijvoorbeeld goed gaan op het moment en wat zou misschien anders kunnen met betrekking tot de rollen die de verschillende partijen hebben?

-Zijn de gemeente en het initiatief ook afhankelijk van elkaar?

Participatie

-Zijn deze overheden bereid om jullie een stukje verantwoording te geven?
(*Zo niet denk je dat ze meer verantwoording geven?*)

-Op wat voor manier worden jullie betrokken in gemeentelijke plannen omtrent klimaatadaptatie?

-Hebben jullie ook inspraak in gemeentelijke plannen m.b.t. klimaat adaptatie?

-Vindt u dat er sprake is van een goede vertrouwensband tussen het initiatief en de gemeente/andere initiatieven?

-Wat zijn de positieve en de negatieve punten in deze samenwerking?

-Op wat voor manier stimuleert jullie initiatief een innovatieve aanpak voor klimaatadaptatie in jullie gemeente?

-Hoe zien de toekomstplannen van het initiatief eruit nadat de huidige doelstellingen bereikt worden?

Outro

Appendix IV: Transcripts of the interviews

The transcripts of the interview are stored by the researcher.