

Mathijs van Tuijn
September 2023
Nijmegen School of Management
Master's Thesis for the Spatial Planning program
Planning, Land and Real Estate Development

Radboud University



Climate adaptation transformations in climate governance



Figure 1, Green space in a petrified area (De Bastei, 2023).

Key words: Climate adaptation, climate governance, transformations

Words of gratitude

Next to the scientific contribution this research process was executed to finish my study. For this I would like to express my deepest appreciation to my thesis supervisor Ary Samsura and the Radboud University for helping me along the way to becoming a better academic researcher and learning the ins and outs of thesis writing.

Of course, the research was not possible without the essential information shared by the respondents. Therefore, I'm extremely grateful to the respondents, and their professional and sincere contribution to this research. Without the help of the municipality Nijmegen, Arnhem, 's-Hertogenbosch, Oss, Wijchen and Gennep, and the organisations Steenbreek and Cobra Groeninzicht this research was not possible.

Abstract

Climate adaptation has high priority in political agendas, on all levels. At the same time, it's hard to implement climate adaptation for local governments and there is persistent failure to reach climate goals. Therefore, it is interesting to expand the knowledge behind this reoccurring event.

While the government is constantly measuring efficiency, climate adaption implementation is not efficient (NOS, 2023b). Hölscher, Frantzeskaki & Loorbach (2018) provide us with the governance capacities framework to help assess the effectiveness of the governance capacities and identify governance capacity gaps. The governance capacities of interest are (1) Stewarding, (2) Unlocking, (3) Transforming and (4) Orchestrating. Since climate governance is ever changing, multiple questions about actor roles, effective governance processes, legitimacy and how effective climate governance in the context of transformations can be supported, arise. However, the framework by Hölscher et al. (2018) does not consider spatial differences between rural and urban. This research paper offers an expanded framework, which is up to date, to add to the planning and geography science fields.

This results in the following main research question: *What is the relationship between governance capacity and green space policy by local governments and to what extent do geographical characteristics influence this relationship?*

To do answer this question, the local governments cases of Nijmegen, Arnhem, 's-Hertogenbosch, Oss, Wijchen and Gennep have been identified as either urban or rural, and studied qualitative. Local government policy documents have been analysed and respondents have been interviewed. The combined data resulted in a scoring table that compares the six local governments with their governance capacities.

The results show that green space policies differ between the municipalities of interest and that rural municipalities have less green space policy compared to urban municipalities. Within the governance capacities the urban municipalities score higher compared to the rural municipalities. Specifically, in their unlocking and orchestrating capacity. The stewarding and transforming capacities are similar for urban and rural municipalities.

There is evidence to suggest an effect from geographical characteristics on the governance capacity and green space policy relationship. More specific, municipalities with more urban characteristics tend to have more green space policy compared to municipalities with more rural characteristics. This is due to their unlocking and orchestrating capacity. This means that, climate governance is better developed in urban municipalities. Here, the conditions are more in favour to, for example, penalise unsustainable activities as petrification. Or to promote alternatives and raise awareness of green space benefits. Thus, addressing climate change and steering climate adaptive transformation can be done most efficiently in urban municipalities.

Table of contents

Words of gratitude	2
Abstract	2
1. Introduction.....	5
1.1 Problems in real life.....	5
1.2 Research Problem.....	6
1.3 Research questions.....	8
1.4 Relevance of the study	8
1.4.1 Scientific relevance.....	8
1.4.2. Societal relevance.....	9
2 Theoretical framework.....	10
2.1 Government investments in public infrastructure in general.....	10
2.2 Green space and its role in climate adaptation.....	10
2.3 The governance idea	12
2.3.1 Climate governance.....	13
2.3.2 Governance capacities framework.....	13
2.3.3. Stewarding capacity	14
2.3.4 Unlocking capacity.....	14
2.3.5 Transformative capacity	15
2.3.6 Orchestrating capacity.....	15
2.4 Rural versus urban.....	16
3 Conceptual framework.....	18
3.1 Operationalization.....	19
4 Methodology	21
4.1 Philosophies.....	21
4.2 Approaches to theory development	22
4.3 Methodological choices.....	23
4.3.1 What data is used?	23
4.3.2 How is this data collected?.....	24
4.3.3 How is this data analysed?	27
5 Local government cases	28
5.1 Nijmegen	28
5.2 Arnhem.....	28
5.3 's-Hertogenbosch	29
5.4 Wijchen.....	29
5.5 Oss	30

5.6 Gennep	30
6 Results	31
6.1 Green space policy	31
6.2 Stewarding capacity	32
6.2.1 Stewarding capacity in Nijmegen	32
6.2.2 Stewarding capacity in Arnhem.....	33
6.2.3 Stewarding capacity in 's-Hertogenbosch	34
6.2.4 Stewarding capacity in Oss.....	35
6.2.5 Stewarding capacity in Wijchen	37
6.2.6 Stewarding capacity in Gennep.....	38
6.3 Unlocking capacity.....	41
6.3.1 Unlocking capacity in Nijmegen	41
6.3.2 Unlocking capacity in Arnhem.....	42
6.3.3 Unlocking capacity in 's-Hertogenbosch	43
6.3.4 Unlocking capacity in Oss	44
6.2.5 Unlocking capacity in Wijchen.....	45
6.3.6 Unlocking capacity in Gennep	46
6.4 Transformative capacity	48
6.4.1 Transformative capacity in Nijmegen.....	48
6.4.2 Transformative capacity in Arnhem	49
6.4.3 Transformative capacity in 's-Hertogenbosch.....	49
6.4.4 Transformative capacity in Oss	50
6.4.5 Transformative capacity in Wijchen	51
6.4.6 Transformative capacity in Gennep	51
6.5 Orchestrating capacity	53
6.5.1 Orchestrating capacity in Nijmegen	53
6.5.2 Orchestrating capacity in Arnhem.....	54
6.5.3 Orchestrating capacity in 's-Hertogenbosch	54
6.5.4 Orchestrating capacity in Oss.....	54
6.5.5 Orchestrating capacity in Wijchen	55
6.5.6 Orchestrating capacity in Gennep.....	55
6.6 Conceptual analysis	57
6.7 Relational analysis	58
6.8 Discussion	60
7 Conclusions.....	61
7.1 Answers to the research questions.....	61

7.2 Theoretical reflections.....	62
7.3 Practical recommendations.....	63
7.4 Limitations of the study.....	63
8 Literature	65

1. Introduction

1.1 Problems in real life.

Last summer, news headlines were full of record breaking weather events (NOS, 2023c, d, e, f, g). Italy, Spain and North-African countries prepare for extreme heat (NOS, 2023c). On Italian islands Sicily and Sardinia temperatures can rise to 47°C or 48°C. Also, in Spain and Portugal temperatures could rise above 40°C. On the other side of the Mediterranean Sea, inhabitants of Morocco, Tunisia and Algeria have to deal with a heat stroke that could rise above 45°C.

Such temperatures have possible negative side effects on health (NOS, 2023d). The high temperatures impact stroke, heart and respiratory problems. Especially touristic hot spots can be a hostile environment, since these people are unprepared and unfamiliar with local conditions. Also, labour can be impossible during the day (NOS, 2023e). For the first time in Greek history construction work and delivery services stood still last year due to the heat. It is estimated that 61.000 people died as a result of the heat in Europe in 2022 (NOS, 2023f). By modern standard this indicates that the heat measures and plans are not enough at the moment. In absolute terms, 114 people on 1 million people died in Europe in 2022 due to heat. In the Netherlands, 469 heat deaths took place. Which results in a smaller rate compared to Europe of 27 people per 1 million.

When focussing on climate adaptation in general, meaning not just heat but also water for example, it turns out that an adaptation gap is present in Europe (Deltares, 2022; IPCC, 2023). An increasing number of regions is preparing for climate change. But the implementation is lacking. On top of that measurements are small scale, not transformative and pointed at certain sectors or limited to certain cities. Chances to accelerate are bigger, however the window of opportunity is increasingly closing.

According to the NOS (2023b), Dutch neighbourhoods are inadequately prepared for extreme weather. Specifically, heat, drought or on the contrary, large amounts of rain, such as at the beginning of July during storm Poly. To make these neighbourhoods heat-resistant, scientists say, more greenery is needed in public spaces, such as parks and trees. That, in turn, will provide better water collection and storage after heavy rains. Tiles and wide streets should give way to trees and underground water collection. The will to tackle gardens, streets and even entire neighbourhoods is present at local governments. But initiators say they encounter delays from municipalities. They have agreed since 2020 to carry out “*climate adaptive*” projects, but implementation is slower than planned. One of the reasons for the delay is that it is unclear which authority is responsible. Where water is managed by the municipality, for example, in many municipalities there is no body responsible for dealing with heat. Jeroen Kluck, lecturer at the Hogeschool van Amsterdam, is researching the heat-resistant city (Spanjar et al., 2022a; Spanjar et al., 2022b; Kluck et al., 2022). According to him, things are also not going fast enough because a lot has to happen at once on a small piece of land. Referring to the “*battle for space*”.

Municipalities do make plans, but in the implementation specifically for heat control, often falls away again, claimed Kluck (NOS, 2023b). According to him, this is also because too little importance is attached to it. It does not have to be complicated, Kluck says. In particular, it involves placing (large) trees. Against heat, shade is the most important measure. In order to do so, it is important that local governments have the right means to implement climate adaptation.

This fact of local governments failing to produce climate mitigation and adaptation is not surprising. It fits the findings of Stoddard et al. (2021), who state that there is a 30-year trend of people

ignoring climate change. Thus, not addressing climate mitigation and adaptation. However, we are now at a tipping point. The increasing stresses on the climate are starting to become so great that they can no longer be ignored or denied. The future will be a significant divergence from the present, regardless of the course that is taken today.

Hölscher, Frantzeskaki and Loorbach (2018) offer a helping hand. They state that there is a persistent failure to reduce emissions decisively, facilitate longer-term resilience against climate change and account for the connectedness of climate change with social, environmental and economic concerns. Their framework enables us to better understand what kind of future the Netherlands can have. More specifically, it helps to investigate the ability of local governments to make green space policy and contribute to climate mitigation and adaptation.

1.2 Research Problem

So far, there are two main research problems. First, the relationship between policy resources and policy by local governments. Or, later, the relationship between governance capacities and green space policy by local governments. Second, the influence of geography on the previous relationship.

Governments are constantly measuring efficiency, since the general discourse is that public money needs to be spent well. The Ministry of Finance has provided a way to measure such efficiency (Ministerie van Financiën, 2021). It is done via policy, as explained graphically in the scheme below (see figure 2). Here you can see the relationship between policy resources on the left and the policy performance and policy effects on the right. The realm of governance capacities is located on the left of this scheme and the output, performance, is on the right of the scheme.

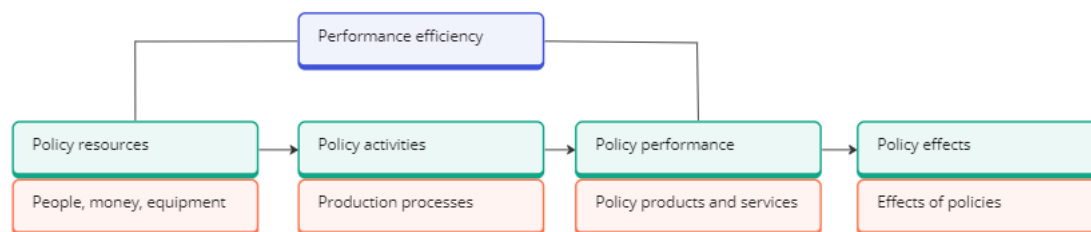


Figure 2, Performance efficiency scheme (Ministerie van Financiën, 2021).

The methods used by the national government to measure performance efficiency are based on benchmarking and is called 'Productiviteitsonderzoek' (Ministerie van Financiën, 2023). There are however, three limitations to this method. First, the limited measurability of performance of many public institutions is a limiting factor: whatever indicators you choose for the aspect of 'quality', it always implies limitations. Careful consideration must be given to how certain performance can be expressed in measurable units and figures. The understanding of productivity is often limited at present. Second, this method is not necessarily aimed at making a statement on why productivity varies and changes. However, when there is sufficient data, this can be additionally investigated. Third, data on the quality of output is often missing, as it is often not collected structurally. Therein lies the danger that productivity appears to have increased, while in practice a longer quality has been delivered for it that is not reflected in the research.

Thus, to address the second limitation by the national government, there is a need for more data collection to investigate why productivity varies and changes. Meaning, that the relationship between governance resources and policy is not understood in depth.

In addition, there is more unknown about the relationship between governance capacities and policy. Hölscher, Frantzeskaki & Loorbach (2018) provide us with the capacities framework to help assess the effectiveness of the capacities and identify capacity gaps. Given the fact that the climate governance is ever changing, they open up multiple questions about actor roles, effective governance processes, legitimacy and how effective climate governance in the context of transformations can be supported.

Van Popering-Verkerk et al. (2022) confirm the above. Governance networks are constantly in motion, and it is still a challenge to monitor governance capacities over a long period of time rather than single snapshots. They advise that future research should focus on gaining insight into the mechanisms and interventions that help strengthen governance capacities.

Thus, the scientific literature needs constant review. Is what is known still valid? This is an important question to ask since we are at a tipping point to determine how our future will take shape, according to Stoddard et al. (2021).

Jeroen Kluck, lecturer at the Hogeschool van Amsterdam, adds to Hölscher, Frantzeskaki & Loorbach (2010) by stating that it is unclear which authority is responsible for climate adaptation aspects (Spanjar et al., 2022a; Spanjar et al., 2022b; Kluck et al., 2022). In other words, it is not clear what resources or capacities are responsible for climate adaptation policy. For example, water is very clearly managed by the municipality. However, in many municipalities there is no body responsible for dealing with heat. As a result, climate adaptive projects are delayed persistently, and implementation of climate adaptation is slower than planned (NOS, 2023b). A broader understanding of the capacities can give answers to the actor roles that are eventually responsible for policy. Thus, at the moment it is unclear what actors, that are part of local government capacities, are of influence on climate adaptation aspects, such as climate adaptation policy.

The second research problem is the influence of geography on the discussed relationship above. In the trend of climate change it is interesting to look at the difference between urban and rural settlements, because both can experience different climate effects. Results of studies comparing urban and rural warming trends demonstrate that many large cities are warming at a rate more than double that of the planet as a whole (Fujibe, 2009; Ren et al., 2007; Stone, 2007). The fact that urban areas are affected harder compared to rural areas would suggest a difference in their planning and governance strategies. Vargo et al. (2016) suggest there are winners and losers from climate adaptive land use planning and design. Here, winners are those who are able to adapt to a changing climate, losers are those who are not. But there is little knowledge about who is more or less able to adapt.

On top of that, the urban-rural relationship has its roots in various disciplines and can be traced back to the Industrial Revolution (Davoudi & Stead, 2002). The evolution of the urban-rural dichotomy has led to complex exchanges and a dynamic web of interdependencies which is shaping urban and rural areas.

Thus, there is a research gap in differences to adapt for urban and rural areas, and the urban-rural dichotomy is shaping those areas. Therefore, this study offers an expanded framework, which is up to date, to add to the planning and geography science fields. This new framework could give rise to new perspectives and alternative ideas in the science field. For example, revisit the classical literature of urban-rural relationship and release them on modern challenges like climate adaptation in the Anthropocene.

1.3 Research questions

A strong research question pinpoints exactly to what is aimed to be found in scientific research (McCombes, 2023). This is essential to guide the paper into the right direction. Therefore, the main research question in this paper will be focused on a single problem and be specific enough to answer extensive:

What is the relationship between governance capacity and green space policy by local governments and to what extent do geographical characteristics influence this relationship?

The research question arises from the explored literature. It combines the geography (rural/urban) and modern climate governance. To help answer the main research question, it is accompanied with the following sub questions:

1. *To what extent do the local governments accommodate the provision of green space in their policies?*
2. *To what extent do local governments have governance capacities related to the provision of green space in their area?*
3. *Are there differences between rural and urban local governments in their way of accommodating the provision of green space in their policies?*
4. *Are there differences in governance capacity related to the provision of green space policy between rural and urban local governments?*

1.4 Relevance of the study

In this chapter the scientific and societal relevance is stated. The scientific relevance is closely connected to the previous chapter (1.2 *research problem*) where the societal relevance is more connected with the introduction (1.1 *introduction*).

1.4.1 Scientific relevance

As stated in a previous chapter, 1.2 *Research problem*, literature has proven to be worth to expand and review. While there is research about the relationship between governance capacities and policy, and the variables included (Ministerie van Financien, 2021 & 2023; Hölscher et al, 2018). The current framework lacks any geographical consideration. Therefore, the current theoretical framework is not sufficient. On top of that, urban-rural climate change effects differ, this suggests a difference in planning and governance strategies (Fujibe, 2009; Ren et al., 2007; Stone, 2007). But, little is researched about who is more or less able to adapt to the climate challenges (Vargo et al, 2016).

In addition, it is important to explore what the usefulness of such a framework could be in the scientific fields. To do this the framework of Hölscher, Frantzeskaki and Loorbach, 2018, is used. They have concluded that the persistent failure of climate goals is changing towards more polycentric, hybrid and experimental approaches that include multi-scale, cross-sectoral and public-private collaborations. They have presented a capacities framework to provide an analytical tool for understanding and supporting the ongoing changes towards transformative climate governance. In their research the case study of Rotterdam prevailed the utility of the framework for assessing the available conditions for the governance capacities and identifying, opportunities, challenges and capacity gaps.

The still ongoing changes in climate governance open up questions about effective governance processes, legitimacy and how effective climate governance in the context of transformations can be supported. Hölscher, Frantzeskaki and Loorbach (2018) invite future research to apply elements of the framework or the whole framework to explore these questions. This research builds on top of the Hölscher, Frantzeskaki and Loorbach capacities framework, The case studies of climate governance in Nijmegen, Arnhem, 's-Hertogenbosch, Oss, Wijchen and Gennep provide evidence for the frameworks applicability. On top of that, it helps the Rotterdam case of Hölscher et al. (2018) to demonstrate how

such a framework can be used to assess the effectiveness of the capacities and identify capacity gaps in the Netherlands.

1.4.2. Societal relevance

Climate adaptation is supported in global, international, national, regional and local policy. However, many construction sites fail to build climate proof buildings and spaces as described in policy, implementation is slow. Hence, the areas fail to maximize a sustainable and liveable environment for future generations. People have to have the opportunity to protect oneself and their communities from extreme climate events. For example, heat waves, heavy rain or flooding. This will impact their health, happiness and even their projected age.

On top of that it means that policy is not effective. What does it mean to have a vision document when no direct action is taken upon it? This is tackling the trustworthiness and integrity of public bodies, which ironically should be empowering talking about climate adaptation.

Financially it is also more attractive to invest in climate adaptation now, rather than in the future. Since much knowledge is present about climate adaptation, a lot can be done today. Investing in climate adaptation sooner rather than later makes sense, because then you would have to catch up. Protecting people now saves more lives and reduces risks moving forward. Take a tree for example, planting it today it has time to grow and create a large shade. Planting the tree when there is a heat wave in 8 years, it has little impact.

One way to predict the climate adaptation policy is to account for geographical location. A full understanding of this concept helps to give policy more impact on the physical spatial development. Which is one of the most challenging developments of the century, in the Netherlands. The research aims to help the spatial transformation to ensure a sustainable liveable environment for future generations.

2 Theoretical framework

This part of the paper provides a foundation for the research and a lens through which the results can be interpreted. The chapter helps to explain the relationships between the relevant literatures.

2.1 Government investments in public infrastructure in general

Government investment creates public infrastructure, which, is important for long-term economic growth and societal well-being (OECD, 2011). Governments spend money constructing communications networks, houses, schools, highways, green and blue spaces, and hospitals.

According to the Raad voor de leefomgeving en infrastructuur public services and infrastructure are a broad concept that is widely used. All public spaces, like streets parks and squares, are part of it. These outdoor spaces have a connecting function to get from a to b and a residential function. In addition, indoor spaces fall under the concept of public facilities. Indoor spaces that can accommodate a multitude of facilities (think libraries, schools, community centres, barber shops, football canteens, (neighbourhood) shops and metro and train stations). In both cases, these can be publicly, semi-privately or privately owned spaces. The means of transport in public transport (metros, trams and buses) can be seen as a part of public facilities. In the literature, instead of the term 'public facilities', the concept of 'public spaces' (with and without roof) or the concept of 'public domain'. Instead of public facilities, reference is also made to 'the socio-physical infrastructure' of cities and neighbourhoods.

An important feature of public facilities is that we can encounter the proverbial 'other' there. There we can come into contact with and have to relate to 'other' behaviour, other ideas and other preferences. This also makes it a domain of surprise and reflection and places should be of interest to different people (Hajer & Reijndorp, 2001). On what it takes to create public facilities (indoor and outdoors) that are inviting for many people to stay and to go to, much has already been researched and written. It involves a range of (design) principles that can be consciously deployed: beforehand in design and layout and during, during use and management.

2.2 Green space and its role in climate adaptation

Green space has multiple functions, to enrich aesthetic and recreational avenues for communities and facilitates the general well-being of, often city-, dwellers and it can help to address public health issues (Attwell, 2000; Maas et al., 2006; WHO, 2016).

However, there is more to it. It is becoming increasingly clear that green and blue infrastructure offers a variety of benefits that can increase our adaptability and resilience to climate change. Green space can play an important role in climate mitigation and adaptation, because they reinforce the process of carbon sequestration (Nowak and Crane, 2002; Escobedo et al., 2010). It aids us in coping with some of the harsh weather that we currently encounter and that could possibly occur more frequently in the future. By creating temporary or permanent water storage areas, capturing rainwater, and allowing it to pass into the soil rather than running off the surface and potentially overwhelming drainage systems, it can, for instance, help us deal with heatwaves by providing evaporative cooling, shade, and the ability for cooler air to flow into urban areas. It can also help us deal with heavy rain by capturing rainwater (Kruuse, 2011; Yu et al., 2017; Nasir & Rahim, 2023). In addition, Gil et al. (2007) demonstrate how green spaces can improve the hydrology by reducing surface runoff and providing ground water recharge while also helping to reduce the urban heat island effect. In addition to serving as natural storm water drains and buffers during extreme events like floods, green areas can help cities adapt to climate change by lowering their vulnerability to such disasters. Urban green spaces can serve as a "soft engineering" solution for coping with climate change (Kitha and Lyth, 2011).

Ecosystem services offered by green spaces are closely related to aiding in catastrophe risk reduction and adaptation to climate change (Munang et al., 2013). The Ecosystem Based Approach (EBA) for climate adaptation has received a lot of attention as a useful, affordable tool (IUCN, 2011).

The following are significant elements of green space in urban form:

- 1) Quantity: what percentage of the urban area is filled with green space?
- 2) Quality: can the green space improve urban biodiversity and provide better ecosystem services?
- 3) Connectivity: how much of the green space is connected?
- 4) Accessibility: how much of the population has access to the green space?

Cities use different types of green space indicators to determine climate resilience. Some strive for a certain percentage for the whole city, other strive for a percentage per square kilometre or per neighbourhood. (Barrera, Reyes-Paecke & Banzhaf, 2016) On top of that there can be ambitions that every household should be within a 5-minute walk to a cool space, often green, like a park or nature reserve (Buiten Ruimte, 2023; see annex 1).

Models like the Urban Forest Effects Model (UFORE) (Nowak et al., 2002). Can be used to qualify important benefits of urban green spaces like carbon sequestration and storage as well as the right tree selection for reducing air pollution. The GIS-based UFORE model can be used to analyse and measure the structure, function, and value of urban forests. The model aids in quantifying the composition of species, quantity of trees, sizes, and placements of trees in urban forests, among other factors. The approach aids planners in assessing current green spaces, determining the need for new tree planting, and enhancing urban forestry.

The model called The Green Space Factor (GSF) can combine different surface areas (Kruuse, 2011). For example, wildflowers and weeds, grass, light or dense forest. It is also taken into account whether the vegetation is in contact with ground water or open water. When there is a car park underneath the vegetation is not in contact with ground water. More sealed areas are assigned a score closer to 0 compared to more open areas, which are assigned a score closer to 1. Even vertically green walls can be taken into account. And combinations of green factors can result in higher points. A grass area with a tree, results in a higher score compared to just a grass area with no trees. On top of that there is the Green Points System that gives green points over a list of 35 factors. Kruuse 2011) concludes that the more points a city has, the greener your city is. And in the end, the greener your city is, the more it is resilient to climate change and extreme weather events: *"it could be of crucial importance in helping us to adapt to climate change, as green infrastructure provision can help to manage temperature extremes, reduce flood risk and help other species adapt to changed conditions"*. And according to Kruuse (2011) tools such as the Green Space Factor and the Green Points System should be incorporated into wider planning systems so that it becomes the norm across all developments.

All in all, there are many different ways of measuring and estimating green spaces. To decide how to measure it is crucial to know why you want to measure. Municipal ambitions are often the reason to measure in the first place. For example, for human health and wellbeing or for biodiversity. These two examples can result in very different ways of measuring. For human wellbeing the green spaces are more measured in terms of looks and for the biodiversity the quality and species are more significant.

Now that we know that green spaces can be measured for many different purposes. We can also discuss the multifunctionality of green spaces. Because green spaces are an indispensable investment for climate mitigation and adaptation. And it is seen as a desirable "win-win" strategy to deploy green and blue infrastructure to support climate change adaptation because it also offers several social, economic, and environmental advantages.

2.3 The governance idea

Governance refers to the management, control and power or the methods of management (Bevir, 2012). Originally the word "governance" is derived from the Greek word "κυβερνάω", which means steering (Huynh-Quan-Suu, z.d.).

The term "governance" has been used frequently since the 1980s (Bevir, 2012). White Papers on Governance are published by the European Union. Global governance challenges include avian flu and climate change. The term "governance" has become widely used both because the world has changed and because people's perspectives on the world have changed as a result of evolving social theories. New ideas and practices have shifted focus away from the state's core institutions and toward the process of governance, which now includes both public and private groups in many instances. Therefore, governance refers to all governing processes, whether they are carried out by a government, market, or network, whether they are applied to a family, tribe, formal or informal organization, or territory, and whether they are carried out through laws, norms, power, or language.

The terms governance and government are frequently used interchangeably. As you may anticipate, these two are not the same. Government and governance are distinct concepts, both conceptually and experimentally (Bevir, 2012). The act of governing is what is meant by the term governance. Governments subject their citizens to it. But it's also what businesses and other organizations do to the people who make up their staff and membership. Furthermore, a group of actors who are hierarchically organized need not actively engage in the governance process. Actor networks and markets both have the capacity to produce coordination and make choices. Whereas governance refers to the processes of ruling wherever they take place, government refers to political institutions.

The term "governance" describes an empirical change in public organization (Bevir, 2012). Government has undergone changes. Governments increasingly rely on individuals from the nonprofit and commercial sectors to administer and provide services. For instance, the state gets into agreements with other businesses to run prisons and train jobless people. For example, to construct roads and train lines and provide humanitarian help, the state enters into agreements with groups. The new governance offers markets and networks more room to operate, whereas government had previously been largely composed of bureaucratic bureaucracies.

The use of governance is both theoretically abstract and empirically specific (Bevir, 2012). The term "governance" refers to all social organization and social coordination processes as an abstract theoretical idea. Because social organization need not include oversight and control, let alone the state, governance differs from government in this context. In the absence of any large government, markets and networks might supply governance. This vague usage of the word governance offers a vocabulary for talking about broad, theoretical issues regarding the makeup of society. coordination and planning.

The shifting organizational practices inside firms, the public sector, and the global order are some of the more specific empirical uses of governance (Bevir, 2012). There is a broad belief that the processes of governing today encompass more diverse players and organizational structures, notwithstanding disagreements about the scope of the new governance and the role of the state in it. Often, observers will speak, more specifically, of a transition from hierarchies to networks and markets.

There are issues with all of these creative governance theories and methods (Bevir, 2012). They force people to reconsider what constitutes effective activity, democratic values, and interpersonal relationships. As a result, numerous social and political objectives have been associated with the term "governance." For instance, good governance is a common theme in debates about aid and development today, yet there is still some disagreement on what constitutes good governance.

The theories, practices, and problems of governance come together in concrete activity. Theories motivate people to do actions that result in new routines and issues. Problems are produced by practices, which stimulate efforts to understand them theoretically. If a problem is to be properly addressed, theoretical study and practical action are both necessary.

Furthermore, the theories, methods, and issues associated with governance all differ from earlier notions of government as being rigid and formal (Bevir, 2012). To begin with, theories of governance frequently reveal the state's opaque workings. They bring attention to the mechanisms and interconnections through which a wide range of social actors and interests shape governmental practices and decisions. The relationship between the state and society also underwent a considerable transformation in the late 20th century. Political actors are increasingly limited by organized and mobilized societal groups in new governance methods. Social actors, such as private companies, non-governmental organizations, and non-profit service providers, increasingly participate in governance alongside states and international organizations. Although there is a great deal of variance in the new connection between the state and society, it is a global phenomenon. The new forms of governance are widespread in both wealthy and developing nations, and they are a key component of plans to control international trade and manage the global commons. Last but not least, present societal issues are not always clearly within the purview of a single organization or even a single nation state. To traverse jurisdictions, connect individuals across levels of government, and activate a range of stakeholders, governance demands new governing tactics.

2.3.1 Climate governance

The literature on climate governance identifies a variety of entry points for comprehending and promoting mitigation and adaptation, such as transformational adaptation to address tipping points and disruptive impacts (Kates et al. 2012; Lonsdale et al. 2015; Wise et al. 2014), experimentation to promote innovation (Hildén et al. 2017; Kivimaa et al. 2017), and orchestration to ensure coordination and integration. Both sustainability transitions and resilience strategies begin with models of the evolution of complex adaptive systems and the extent to which system change can be foreseen and handled in a strategic and systemic manner. Approaches to sustainability transitions put a focus on creating disruptive technologies to get beyond unsustainable route dependencies (Loorbach et al. 2015; Frantzeskaki et al. 2012; Raven et al. 2010), as well as the instability of regimes (Kivimaa and Kern 2016; Geels 2014). In order to deal with developing disruptions and hazards and prevent negative transformations, resilience approaches primarily concentrate on adaptive governance (Chapin et al. 2010; Plummer 2013; Folke et al. 2005). For creativity and experimentation, they also study transformational agency (Westley et al. 2013; Olsson et al. 2014). Last but not least, the research on meta-governance describes coordination procedures that enable goal alignment and coordinated action among numerous players and networks in fragmented governance systems (Srensen 2006; Kooiman and Jentoft 2009; Capano et al. 2015).

Climate governance is defined by Hölscher, Frantzeskaki and Loorbach (2018) as the processes of interaction and decision-making by which multiple actors seek to address climate mitigation and adaptation while purposefully steering societies towards low-carbon, resilient and sustainable objectives. This is a very general concept that encompasses a broad range of subjects and topics. In this research, we focus on the specific part of climate governance named climate adaptation, which is still part of the climate governance and therefore we still refer to climate governance as defined above.

2.3.2 Governance capacities framework

Hölscher, Frantzeskaki and Loorbach (2018) provided a conceptual framework for transformative climate governance. The processes of interaction and decision-making by which several actors attempt

to address climate mitigation and adaptation while actively guiding societies toward low-carbon, resilient, and sustainable goals are what we refer to as "transformative climate governance."

The framework supports empirical research on climate governance. Hölscher, Frantzeskaki and Loorbach (2018) identify the types of governance activities that manifest in transformational climate governance capacities using the city of Rotterdam as an exploratory case study. The framework identifies four government functions:

1. *Stewarding capacity*
2. *Unlocking capacity*
3. *Transformative capacity*
4. *Orchestrating capacity*

2.3.3. Stewarding capacity

Scholars studying resilience and climate governance place an emphasis on the institutional, social, and physical conditions that allow social-ecological systems to recognize, guard against, and recover from disturbances and surprises while enhancing wellbeing and avoiding significant change. In addition to taking into account underlying socio-economic vulnerabilities like injustice, responses can range from short-term coping to disaster response to setting up the conditions for longer-term adaptation and resilience.

Stewarding capacity is defined as the abilities of actors to anticipate, protect and recover from disturbances while exploiting opportunities beneficial for sustainability. It appears when there are favourable circumstances for proactive and adaptable reactions to ongoing and uncertain change. It is possible to anticipate emerging disturbances and uncertainties and identify viable solutions in light of them thanks to knowledge generation and integration regarding the dynamics of social-ecological systems. The ability of organizations, communities, and individuals to freely and adaptably respond to changes and disturbances is supported by decentralized self-organisation and context-specific rulemaking. For the purpose of establishing a collective memory of adaptation choices and for modifying management rules in response to learning what works and what doesn't (anymore), monitoring and continuous learning are essential.

2.3.4 Unlocking capacity

Climate governance scholars examine a variety of mitigation strategies, such as emissions accounting, disincentives, and the discontinuation of high-carbon practices. The methods for exposing and dismantling unsustainable, highly path-dependent regimes that are deeply ingrained in prevailing behaviours, actor networks, institutional structures, and infrastructure designs and that support maladaptation are highlighted by sustainability transition scholars. The objective is to make institutional space for more environmentally friendly behaviours.

Unlocking capacity is defined as the abilities of actors to recognise and dismantle structural drivers of unsustainable path dependencies and maladaptation. The revelation of drivers of unsustainability and path dependencies creates the condition for revealing institutions, technologies and behaviours that need to be strategically phase-out. A reduction in the comparative advantage of business as usual in favour of developing alternatives is made possible by undermining vested interests and existing (financial, regulatory) incentive structures, for instance by penalizing unsustainable activities. Breaking

down barriers to change reduces support for the status quo and raises awareness of and possibilities for alternatives.

2.3.5 Transformative capacity

The development and testing of novel theories, stories, practices, policies, and solutions to transform established institutions, infrastructures, behaviours, economies, etc. is encouraged by literatures on sustainability transitions, resilience, and climate governance. The learning processes involved in testing innovations and their subsequent mainstreaming into policy and decision-making processes are important activities.

Transformative capacity is defined as the abilities of actors to create novelties and embed them in structures, practices and discourses. Creating the condition for novelty creation ensures space, resources and networks for developing and testing innovations. To challenge dominant regimes and motivate wider acceptance, uptake and replication, the innovation needs to gain visibility and it needs to be anchored in existing or new structures, cultures and practices to make the implications and lessons from an innovation generalizable.

2.3.6 Orchestrating capacity

The term "orchestration" is used in the literature on climate governance to characterize indirect intermediation efforts, such as those carried out by international organizations like the UNFCCC in order to coordinate, enlist, and assist state and sub-national players in their climate actions. The need of intermediary spaces and strategic alliances for integrating and mediating various social interests and resources within polycentric governing frameworks is emphasized by transition and resilience experts. The alignment, mediation, and rule-setting processes that provide coordination in fragmented governance systems are identified by the meta-governance literature.

Orchestrating capacity refers to the ability to coordinate multi-actor processes and foster synergies and minimise trade-offs and conflicts across scales, sectors and time. Strategic alignment is a key condition for orchestrating, because it supports the formulation of shared and long-term goals towards which actions are oriented. In open networks, mediating across scales and sectors creates the ideal conditions for the exchange of information, the resolving of disputes, and the sharing of resources. The establishment of opportunity contexts assures the existence of broad framework circumstances that encourage, and support behaviours aimed at common, long-term objectives.

Governance capacity	Condition	Activities and supporting sources
Stewarding capacity	Generating knowledge about system dynamics	Developing systems models of feedback across scales, sectors and time Integrating different forms/sources of knowledge and understanding Identifying and communicating sources of uncertainty
	Strengthening self-organisation	Creating decentralised and nested institutions and social networks across governance scales that fit to social and ecological contexts and have multiple centres of power Creating open and simple institutions and rules (e.g. rules-of-thumb) that nurture diversity and redundancy to enable flexible patterns of behaviours and adaptation of rules if needed Ensuring inclusive dialogue and participation to enhance awareness of risks, responsibility sharing power balance among interest groups
	Monitoring and continuous learning	Iteratively evaluating how the system responds to disturbances and management Building a collective social memory of experience for linking past experiences with present and future, improving routines Systematically revisiting and questioning underlying assumptions and objectives
Unlocking capacity	Revealing unsustainable path dependency and maladaptation	Identifying sources and responsibilities for undesirable side-effects, (market, political, etc.) failures and maladaptation, monitoring trends in stressors and impacts Monitoring trends in stressors, vulnerability analyses, identifying areas with higher/increasing risks and how changes affect different needs and interests
	Undermining vested interests and incentive structures	Withdrawing support for regime technologies, structures and practices Adjusting legal rights and responsibilities to create (dis)incentives and control policies Breaking up existing actor networks, replacement of key actors Divesting in human and financial capital that underlie regime structures
	Breaking open resistance to change	Fostering political willingness and public awareness for change Developing and strengthening (political) counter-movements and support networks
Transformative capacity	Enabling novelty creation	Developing, testing and experimenting with new paradigms, practices, processes Providing protected and informal spaces to nurture innovation Supporting and creating informal and heterogeneous (shadow) networks that develop and test innovation and experiments
	Increasing visibility of novelty	Creating forging alliances and advocacy networks Creating internal support within an organisation through political leadership Providing inspiration through communicating future visions and showcasing innovation
	Anchoring novelty in context	Anticipating and recognising opportunities for change and crises Aligning strategic, organisational, institutional and implementation processes and structures with the novelty, e.g. in overarching policy documents and operational checklists Learning from tested solutions and practices Providing resources (e.g. manpower, skills, finances) to wider practical implementation
Orchestrating capacity	Strategic alignment	Defining a shared, long-term and integrative strategic direction and reference points for governance (shared goals, vision, narrative) Enlisting and engaging heterogeneous actor groups to create ownership over strategic direction and steer action in line with goals Linking strategic direction to ongoing processes
	Mediating across scales and sectors	Recognising, brokering and integrating resources (financial, knowledge, human, etc.) and goals Creating formal and informal convening spaces to exchange knowledge and resources and manage conflicts Setting up formal and informal connection nodes, communication channels and facilitating information platforms to optimise interactions and link formal and informal processes
	Creating opportunity contexts	Providing institutional designs for synergies and action in line with goals (e.g. financial incentives, regulations, taxation, recognition, shaming) Assisting actors and networks in implementing actions in line with goals (e.g. financing, guidance, technical assistance) Determining (normative) action mandates and prioritising action and fields Incorporating long-term and multi-scale thinking into decision-making, implementation processes and performance reviews

Figure 3, *The transformative climate governance capacities framework: capacities, conditions and activities for transformative climate governance* (Hölscher, Frantzeskaki and Loorbach, 2018).

2.4 Rural versus urban

Rural and urban are two terms used to describe different types of areas, typically in relation to human settlement patterns. Both terms were popular themes since the 20th-century and often refer to some model of modernization or the transformation of rural traditional societies (Frisch, 1979). It has been one of the central themes of the literature on urban and territorial studies (Arellano & Roca, 2017). Paul Bairoch, an economic historian, suggest that cities started forming after the development of agriculture (Bairoch, 1988). Only after people could survive stationary, they were able to form permanent settlements. Stating that cities foster innovation and economic development, they are the driving factor behind our economic development. However, Jane Jacobs does not agree (Jacobs, 2016) She states that cities originate first among hunting and gathering people as craft and trade centres. Only then, the growing density of these urban agglomerations produced the creative innovations that led to agriculture.

Despite of all the literature, there is no universally accepted definition of what constitutes rural and urban areas, the terms generally refer to areas with more rural or more urban characteristics. Most of the time contradicting each other. Therefore, comparative studies at the national and subnational levels of a scientific nature are sometimes hard. For example, the United Nations (later UN) define urban and rural populations with political and administrative variables, which make it hard to use the data adequately to understand settlement structures from different countries. A very accurate way to identify rural and urban areas is by measuring the urbanization gradient (Arellano & Roca). This gradient can differentiate between villages, cities metropolitan areas, rural, rurban, periurban and central landscapes.

Still, it is not clear what the terms mean. The dictionary tells us that rural refers to “*in, of, or like the countryside*” (Cambridge Dictionary, 2023). For example: “*the area is still very rural and*

underdeveloped". And urban refers to "of or in a city or town". For example: "many Americans were leaving the farm for the promise of urban life".

It is clear that rural areas are typically sparsely populated and characterized by a low population density. These areas are usually associated with natural landscapes such as forest, fields and farmlands, and they often have a more traditional way of life. On the contrary, urban areas are typically densely populated and characterized by a high population density. These areas are usually associated with serviced landscapes such as buildings, infrastructure and pavement, and they often have a more modern way of life.

Meaning, the difference in rural and urban areas can be made in two-fold. On the one hand, physical differences in the area. On the other hand, cultural differences. Above mentioned as ways of life. Multiple authors have suggested that there is a growing divergence between the political attitudes of urban and rural peoples in the United States (Bishop & Cushing, 2008; Johnston, Manley, & Jones, 2016; Rodden, 2019) and in Europe (Jennings & Stoker, 2016; Maxwell, 2019). Rural inhabitants are politically more conservative and nationalistic compared to urban inhabitants (Cramer, 2016). It gives clues that urban inhabitants became increasingly progressive while at the same time rural inhabitants did not. Or it could be the other way round, rural inhabitants became increasingly conservative while at the same time urban inhabitants did not.

Huijsmans et al. (2021) found an increasing difference between rural and urban cultural attitudes, from 1979 till 2016 in the Netherlands. The divergence is mostly due to the fact that the attitudes of people in the large cities differ from those in other parts of the country. Trends in rural areas are similar to another. The strongest divergence is in very strong urban municipalities, suggesting that inhabitants of the inner cities of large metropolitan areas hold unique progressive cultural values.

3 Conceptual framework

In this chapter the expected relationship between the research variables is shown. This is done to define the relevant concepts for the research process, and it explains how they come together to draw a coherent conclusion.

According to Daniels & Trebilcock (1996) a government institution is efficient in bearing risks, given it has the greatest capacity to spread the risk. On top of that they state that the government has a large financial capacity to invest in public infrastructure and other projects compared to private parties.

Nishizawa (2018, p. 946) adds that “*successful implementation of Public Private Partnerships (PPP) depends critically on government capacity, commitment and policy*”. The author concludes that an early introduction of PPPs without a well-designed institutional framework and implementation capacity could end up with ex-post public sector support and corrective measures.

Williams, Rosendo, Sadsing & Celliers (2019) identified local governance capacities needed for implementing climate change adaptation for Mauritius. And concluded that local governments (in island states) should focus on the technical know-how, financial and human resources, stringent legislation and effective monitoring mechanisms in order to assure effective climate change adaptation.

Erken, van Es & van Harn (2021) conclude that government capacities are determining national prosperity. There is a direct relation between public R&D capacities and productivity and GNP. In the private sector investment in capacities pays itself out in the end, the same would work for public bodies. This conclusion suggests there is a positive relationship.

Based on these authors, it can be assumed that there is a direct relationship between governance capacities and green space policy. Here a positive relationship is expected. If the governance capacities increase, green space policy increases, either in quality, quantity or both.

There are four capacities that influence green space policy. These have been discussed in literature, see previous chapter. Other literature, Fujibe (2009), Ren et al. (2007), Stone (2007), Vargo et al (2016), and the absence of literature, suggest that there is more information needed about another variable: geography with urban and rural characteristics. More specifically, rural and urban areas influence green space policy. Based on this suggestion the following conceptual frameworks arise:

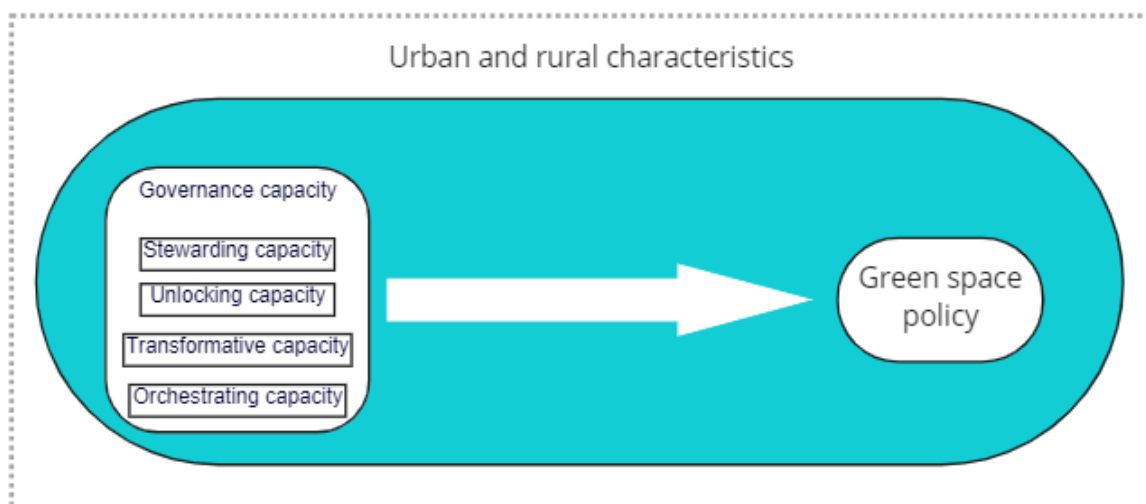


Figure 4, Conceptual framework

The conceptual model above shows that there a relation is present between the governance capacities (independent variables) and green space policy (dependent variable). And this connection is happening in either an area with urban and/or rural characteristics.

It is expected that urban and rural characteristics determine the content of the governance capacity, which influence green space policy. A more urban area requires more thorough governance capacity and green space policy compared to a more rural area. And a more rural area requires less thorough governance capacity and green space policy compared to a more urban area.

3.1 Operationalization

In this chapter the definitions and operationalization of core concepts are given.

Concept	Definition
Governance	Management, control and power or the methods of management.
Climate governance	The processes of interaction and decision-making by which multiple actors seek to address climate mitigation and adaptation while purposefully steering societies towards low-carbon, resilient and sustainable objectives.
Green space policy	Policy devised to promote green space.
Governance capacities	Manifested activities within governance.
Stewarding capacity	the abilities of actors to anticipate, protect and recover from disturbances while exploiting opportunities beneficial for sustainability
Unlocking capacity	the abilities of actors to recognise and dismantle structural drivers of unsustainable path dependencies and maladaptation
Transforming capacity	the abilities of actors to create novelties and embed them in structures, practices and discourses
Orchestrating capacity	the ability to coordinate multi-actor processes and foster synergies and minimise trade-offs and conflicts across scales, sectors and time

(Table 1)

Figure 5, Operationalisation research concepts

Dimension/Concepts	Variable	Sub variable	Sub sub variable	Indicator	Literature	Data source	Questionnaires/Interview questions
Stewarding capacity	Vast knowledge about National, regional and local	Contribution to research	Scenario's maps	maps	Ligtvoet et al. 2015	Public document Gebiedsvisie	
				participatory vision	RCI 2012	Public document climate maps	
				risk assessments	Frantzeskaki et al. 2012	Public document Binnestadslab/Hartje Nijmegen	
Unlocking capacity	Efforts to recognise and support network of	Research on drivers of	Pertification rate/goals	Province of South H	Province of South H	Public document Weerbaarheidsanalyse/ Interview	
		Political support	Support from the council			Public document/media	
		Political support	Budget in Euro's			Interview/raadsbrief/medi	Does the council support green space transformation projects and how?
Transforming capacity	Out of the box thinking	Projects that provide in	Strategic goals			Public document	
		Operational processes	Upscale and replication			Public document/Interview	What are the strategic goals and how do they contribute to climate resilient city?
Orchestrating capacity	Long term strategic direction	Narratives, solutions design and implementation	Policy documents			Interview	What projects/practices are/have been upscaled or replicated?
		Networks and community	formal and informal networks and community			Policy documents	
Green space investments	facilities		Rijksbijdragen	CPB, 2018		Interview/public document	How much does your institution get from Het Rijk? Last couple of years and coming years?
		motivation to invest	climate adaptation benefits in Euro's	Demand for public research	CPB, 2018	Interview/public document	How has the demand for public investment developed over the last year, and in the future?
		Intrinsic motivation	referring to green spaces	Personal views		Public document/research	
Green space policy	Policy documents		grass			Interview	Do you like green space? Why? Do you have a personal motivation to increase green space investment
			tree			Public document	
			bush			Public document	
			green			Public document	
			Ambitions/goals			Public document/Interview	What are the green space ambitions and goals

4 Methodology

This chapter elaborates on the methodology of the research. Saunders and Lewis (2018) suggest using the research onion in figure 6 to do this. The outer layer of philosophy serves as the starting point, while the inner layer of data collecting and analysis serves as the last phase, as shown by the arrow in figure 6. The onion will be used as a road map to explain the research technique in this chapter. To ensure a certain level of coherence across the methodological setup of the research, it was decided to adhere to the research onion setup. The research design will be covered first, then the data requirements, data collection, and data analysis, following the onion's structure. Finally, details about the research's validity and dependability will be provided.

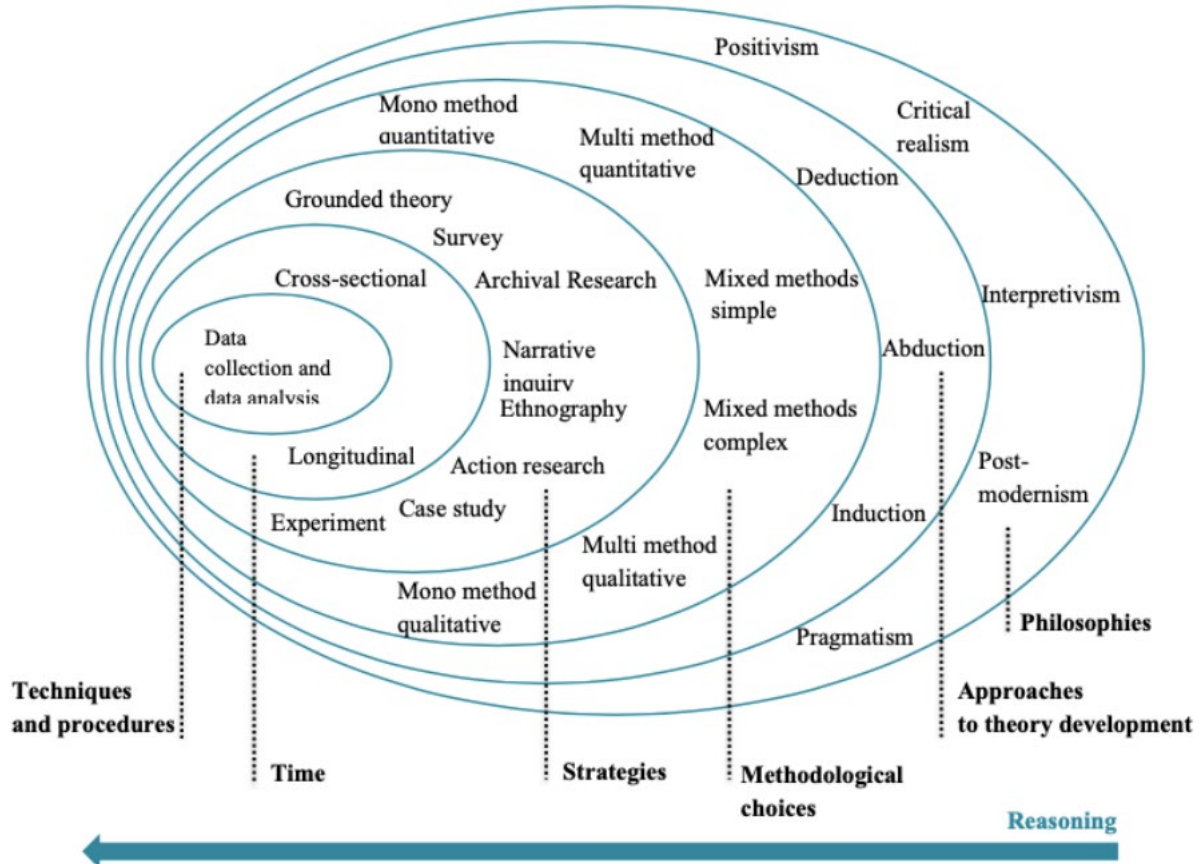


Figure 6, Research onion (Saunders & Lewis, 2018).

So as stated above the first three layers of the onion are addressed: Philosophies; Approaches to theory development; Methodological choices. This helps designing the research's general plan on how you will go about answering your research questions (Saunders, Lewis & Thornhill, 2016).

4.1 Philosophies

Following the research onion, we start with the research philosophy. This is the perspective towards interpreting the research problem, which are beliefs and assumptions that guide the research principles (Guba & Lincoln, 1994). According to Saunders and Lewis (2018), there are five research philosophies that can be distinguished: positivism, (critical) realism, interpretivism, postmodernism, and pragmatism. As can be seen in the research onion most outer layer.

The majority of positivism's applications are in the physical and natural sciences, and it employs highly structured techniques like structured surveys and structured observations. It is intended to collect unadulterated data and facts that are unaffected by human judgments or bias by using standardized approaches. A researcher should make an effort to remain objective and separated from his research in order to prove this. Secondly, Saunders and Lewis go on to discuss (critical) realism, sometimes

known as post-positivism. Direct realism, the first type of realism, bases its claims on the idea that reality is what we perceive with our senses. Critical realism, in contrast, is more concerned with describing the experiences and the structures that shape the observation. So, in addition to seeing, one need also describes how the observed event came about. Third, interpretivism is discussed. The main cause of interpretivism is a complicated organizational structure. It keeps track of social occurrences in their natural setting. As it attempts to distinguish humans as social actors, it is particularly pertinent to marketing, organizational behaviour, and human research management. Fourth, postmodernism emphasizes language and power dynamics. It attempts to give voice to different ideas while emphasizing the influence of conventional ways of thinking. The main criticism they level at positivism is that it ignores the power of words. The final school of thought is pragmatism. The research questions and objectives, according to pragmatists, are the main determinants of the study design. It seeks to provide relevant solutions (Saunders & Lewis, 2018).

In essence all scientific research follows some form of positivism, since it is believed science will generate valid knowledge. Just like is intended with this research. But is not the most fitting research philosophy, because it entails a relatively new topic of interest and factual data is scarcely available. Interpretivism focusses on organizational complex phenomena and the interest is to find common variables that explain the decision-making of organisations. It is relevant for organizational behaviour since it tries to differentiate humans as social actors. The postmodernist philosophy investigates language and power relations and attempts to integrate viewpoints. In addition, the research is out for common viewpoints for different developing organisations, not suitable for this research. The pragmatism philosophy might be suitable because the research wants to explain structures and give pragmatic insights. However, this does not entail solving problems or complex situations. Comparing the research philosophies, interpretivism is the most suitable for this specific research. Because it relates to organizational complexity (Saunders & Lewis, 2018). As this research attempts to explain what governance capacities, challenges and gaps for green space investments are.

4.2 Approaches to theory development

There are three methods for developing a theory: deductive, abductive and inductive. Each varies in the application and in time order (Saunders et al, 2016). Deductive research is the most structured and begins with the formulation of research questions based on prior knowledge.

With the use of deductive theory models or hypotheses can be formed. The literature review offers expectations about what can be found in this research. To test this hypotheses data will be collected based on the operationalized variables. The theory can then be analysed to see if it is supported by reality or if it needs to be modified. Deductive research therefore begins with a theory that is later validated in the real world. Inductive research, however, begins with observations. It is attempted to turn those observations into universal theories. The main purpose of inductive research is to comprehend the significance that people give to events. Inductive research thus begins with observation of reality and ends with the development of theories. Lastly, abductive research alternates between theory and evidence rather than going from one to the other. It always begins with the observation of a peculiar phenomenon, for which workable theories are then sought. More surprising observations are frequently found as a result of this process (Saunders et al., 2016; Saunders & Lewis, 2018).

This research follows a deductive theory development path. First literature on governance, governance capacities, green space investments and geography is collected. With this knowledge the relationship is defined between governance capacities and green space investments and geography. This relationship is later tested using other research methods. Here a deductive approach is followed because data to make the relation between governance capacities, green space investments and geography are not directly presentable. As a result, this study begins with theory before turning to

data. Before entering the field of study, starting with theory enables one to become more aware about the topic and allows the addition of more structure to data collection. For example, interviews. Additionally, beginning with theory allows for the option of generalizing study results to some extent and can be used when there is little time left to complete the research (Dudovskiy, 2022). The deductive approach is preferable in this study since it intends to generalize the research conclusion to all municipalities and policies in the Netherlands.

4.3 Methodological choices

In this chapter the methodological choices are presented. First, methodological choices are explained. Second it is explained what data is needed for this research. Third, it is explained how this data is collected. And last, it is explained how the data is analysed.

This study uses a qualitative research design. This is because qualitative research, which examines the whole instead of particular details, is more comprehensive than quantitative research. Since the purpose of this research was to identify an effect and revisit classical literature, it was crucial to take a comprehensive approach. Polit and Beck (2012) provide a concise explanation of how quantitative and qualitative research vary from one other. They claim that precision and control are related to quantitative research. Research on phenomena is done in a fairly systematic, statistical manner. Surveys and controlled experiments are two examples of how to accomplish this. Comparatively, the emphasis of qualitative research is on narrative. This is accomplished by using a thorough method that is holistic on phenomena. In practice, this means that methods as focus groups, interviews, videography or photography may be useful. This indicates that the cases put forward in chapter 2 served as the focal points of this study and were open to all points of view.

As previously said, a major factor in choosing qualitative research in this instance over quantitative research has been its holistic nature. The in-depth emphasis on particular case studies and openness to all points of view. Since this research is primarily concerned with four particular cases, it can learn interesting things about the practices and habits of the local government institutions. It is possible that quantitative research was unable to fully amplify all of the motivating of local government employees. This research is more in depth because using interviews gave the researcher the chance to ask questions based on the interview responses.

Creswell and Poth (2018) have described various types of qualitative research in their book. This research will be a case study, which is one of these types. In a case study, the focus is on a particular case that occurred in a particular location and how this case was understood (Creswell and Poth, 2018). Because of its particular focus on local government institutions, Nijmegen, Arnhem, Wijchen and Oss, this study is categorized as a case study. And because multiple cases are involved, it can be called a comparative case study. Using a variety of methods and resources is crucial while doing a case study (Creswell and Poth, 2018). A combination of different types of research methods is called triangulation and has a couple of functions (Creswell & Poth, 2018). Firstly, the researcher can get a complete insight in the research problem(s). Secondly, a detailed and balanced scope of the current situation appears. Thirdly, the research validity is guaranteed. Lastly, the triangulation strengthens trustworthiness because limiting a less reliable method prevents producing invalid research results (Peters, 2017; Vennix 2016). In this research three different sources of data are used to enhance the research quality. First literature is used as a theoretical base, interviews will then be used to strengthen the theory, or these can lead to new insights. And policy documents are analysed to create a further understanding.

4.3.1 What data is used?

In chapter 3.1 (Operationalization) the concepts of the conceptual model are operationalized. The data that is needed is identified as indicators which can be measured. There is, however, a difference in some indicators. Most indicators are written down in texts, visualisations or numbers. But some are

manifested in ideas and visions, which makes them harder to measure. Therefore, there are three different types of data used: documents (mostly policy documents); expert conversations; media posts.

As the operationalization matrix suggests, most of the data comes from documents. This is due to the fact that public bodies have to argue their decisions based on extensive research. The municipality of Nijmegen for example, has produced, often in cooperation with an independent party, multiple policy documents about climate challenges in the city. On top of that, they have mapped the entire city to make calculations and estimations about, water, heat, and mobility. For a smaller municipality this might not be the case, since they have fewer financial means and expertise. Here interviews can compensate for the lack of information. So, documents are preferred in this research, and only later, interviews are used to fill the data gaps.

On top of that there are some indicators that can only be known through interviews, and not via documents. This is the case for all municipalities involved. Here, the focus is not on the amount of data, but rather on the quality of the data. An expert interview who answers the questions directly and with depth is preferred over a four-hour long interview. At the start of the research the aim is to interview three experts for each case study, meaning three different experts from each municipality.

The main variables in this research are:

- Vast knowledge about future climate-related risks and vulnerabilities
- Efforts to recognise and reduce drivers in petrification/non green space
- Different governance levels come together to share knowledge and develop innovations
- Long term strategic direction
- Facilities
- Motivation to invest

4.3.2 How is this data collected?

To collect data six local government cases have been selected. Three have been selected on the basis of urban characteristics and three have been selected on the basis of rural characteristics. Further exploration of these local governments are discussed in *chapter 5 Local government cases*. Later on in the research, both the term local government and municipality are used as substitutes, this is done because in the Netherlands a local government is embodied by a municipality.

To collect the needed documents the website of the relevant municipality is used to retrieve public documents. On top of that employees are asked, during an interview or via email, for the documents that cannot be found on the website or which not to forget. The most recent documents are used. This ensures the research is up to date. Even a document that is not publicly available during the writing of the research can be used for the municipality of Nijmegen, since the researcher has permission from the institution. This accounts for the *Weerbaarheidsanalyse 2022*.

Ideas and visions of municipality employees are collected via interviews, which are planned by sending the employees an invitation via email. Since the researcher works for the municipality of Nijmegen these connections can be made and a low non-response is expected. On top of that the work email can be used to connect with other municipalities, and also generate a high response in reasonable time. When the researcher would send an email from his student mail the reaction could take a long time.

And during the first interviews the question can be asked if the interviewees know colleagues that are interesting to interviews too. This snowball style of networking is used to generate more respondents. On top of that it offers very relevant respondents because the expert probably knows best which colleagues are most fit for the job.

The interviews will be recorded if allowed by the interviewees. During a regular interview the recording will be done via a mobile phone. Later this document can be uploaded to the researchers Google Drive and used on their computer to analyse further. During an online interview the recording will be done via Microsoft Teams. Other than the recording via a mobile phone, this will also save the video. The advantage of using Microsoft Teams is that the program can transcribe the conversation in real time. This gives a notification to all meeting members.

The interview data that has been collected is as follows:

Municipality	Function	Name	Datum
Nijmegen	Beleidsadviseur water en klimaatadaptatie	Sigrid van Haren	7/6
Nijmegen	Senior adviseur groen en klimaatadaptatie	Ton Verhoeven	7/6
Oss	Department IBOR (Inrichting, Beheer en Openbare Ruimte)	Rudi Schleedoorn	21/6
Oss	Advisor Ecologie & Natuur	Nina van Schagen en Danielle Gijzen	26/6
Oss	Head of department Real Estate	Sandra Hofman	20/6
Oss	Policy advisor LWE	Petra Kamsma	19/6
Wijchen/Druten	Policy advisor Groen Natuur en Landschap	Anonymous	27/6
Gennep	Klimaat	Michiel de Greef	20/7
Gennep	Milieu kundige	Werner Neelen	02/8
Arnhem	Policy advisor Groen en Ecologie	Robin Driessen	14/6
's-Hertogenbosch	Policy advisor water and climate	Demi Durand	21/08
's-Hertogenbosch	Policy advisor	Jan van der Heijden	31/08
's-Hertogenbosch	Policy advisor	Bart Verhoeven	31/08
Nationaal	Operatie Steenbreek – Directeur van stichting	Henk Jense	21/6
Nationaal	Cobra - Groeninzicht	Dirk Voets	5/7

(Table 2)

A list of the used and analysed policy documents per municipality is as follows:

Nijmegen (Table 3):

Title	Public/internal	Number of pages
Nijmegen stad in beweging omgevingsvisie 2020-2040	Public	100
Klimaatadaptatie strategie Nijmegen	Public	36
Binnenstadslab Nijmegen over 10 jaar: een stad met trots	Intern	17
Het nieuwe actieplan voor Hartje Nijmegen	Public	1
Ruimte. Mensen. Toekomst.	Public	127

Weerbaarheidsanalyse 2022 Gemeente Nijmegen		
Stenen eruit, groen erin!	Public	36
Collegevoorstel Biodiversiteitsplan Nijmegen	Public	4

Arnhem (Table 4):

Name	Public/internal	Number of pages
Ontwerp Omgevingsvisie Arnhem 2040	Public	90
Strategie Klimaatadaptatie Arnhem 2020-2030	Public	16
Bomenplan	Public	52
Groen visie 2017 – 2035	Public	43

Wijchen (Table 5):

Name	Public/internal	Number of pages
Concept omgevingsvisie	Not published yet	---
Strategisch kompas: Wijchen2025 'De kracht van Wijchen'	Public	61
Actieplan Klimaatadaptatie gemeente Wijchen	Public	4
Regionale Adaptatie Strategie Rijk van Maas & Waal	Public	30

Oss (Table 6):

Name	Public/internal	Number of pages
Gebiedsvisie Vitaal Buitengebied Oss	Public	67
Visie Stedelijk gebied Oss – Berghem 2022	Public	85
Concept gebiedsvisie Stadjes en Kernen 2023	Public	54
Routekaart Groen, Blauw & Natuur	Public	56

Gennep (Table 7):

Name	Public/internal	Number of pages
Omgevingsvisie Gennep	Public	111

Groener Gennepe, Groenbeleidsplan 2021-2031	Public	35
---------------------------------------------	--------	----

's-Hertogenbosch (Table 8):

Name	Public/internal	Number of pages
Koersdocument Omgevingsvisie	Public	36
Beleidsplan s'Hertogendenbosch Groen en Klimaatbestendig	Public	27
Bomenbeleidsplan september 2017	Public	84
Bestuursakkoord gemeente 's-Hertogenbosch 2022-2026	Public	Webpage

4.3.3 How is this data analysed?

Methods of data analysis vary and depend on the methods of data collection and cases (Harrison et al, 2017). The most important part of data analysis is the use of multiple methods. According to Yin, all measurements are subject to error. As a result, using multiple ways will be crucial in data analysis and the theoretical framework will serve as the standard against which the analysis of the empirical data will be measured.

The data that is mentioned before, is analysed through Atlas.ti. This program is helpful to analyse textual documents and sentences or words. In the case of this research this was needed to form a clear overview of the different perspectives given by the interviewees. It has been decided to combine all of the sources being analysed into one project in Atlas.ti because there are various sources being analysed, interviews and policy documents. By doing this, it will be simple to apply the same codes to all the documents and analyse them all uniformly. Coding help ensure that the analysis is valid and approached systematically, because it is transparent. This makes coding an essential first step in qualitative analysis.

The text has been carefully read before being used in both the interviews and the policy documents. Later, the text has been coded by the AI tool of Atlas.ti. Manually these codes are grouped based on the indicators in chapter 3.1. Open coding predominated in the beginning; after that, codes were reused when they made sense for more quotes. Meaning, there first is a inductive way of coding and second a deductive way of coding called a hybrid approach (QUT Design Lab & Swann, 2020). The first analysis will start here too, coding and analysis can take place simultaneously. Themes and patterns are expected to emerge while and after coding. The focus has not been on how the policy documents are prepared or how specific measures have been transmitted in the case of the policy documents. The focus has solely been on collecting more data regarding the research indicators. Since the documents contain mostly statements and visions, they have been suitable for this goal.

There are two main types of content analysis. 1. Conceptual Analysis and 2. Relational Analysis (QUT Design Lab & Swann, 2020). The first one can also be called thematic analysis. This analysis focusses on the themes that appear across several texts and quantifies occurrence of coded concepts. In addition, the frequency of occurrence can be expressed as total number, probability or percentage. As a result, the Conceptual Analysis is effective for identifying and exploring important concepts and themes in the data, describing your data and relating to variables.

The second one too focusses on identifying themes or concepts in texts. But it expands on conceptual analysis by analysing relationships among coded concepts. For example, themes, issues, words or phrases. And the analysis is based on the idea that meaning can be found in concepts that are related and in the nature of those relationships. The Relational Analysis is effective for exploring meanings and associations in the data, relationships between concepts in text give meaning to one another and it is useful to establish causality or other relationships.

For this research both analyses are useful. Since it is interesting to see how many times a certain word occurs in the local government documents. This gives a good indication of important and popular words. On top of that it is interesting to know the relations between codes within one document and between different documents. This helps to compare the different local governments. So, a mix of both Conceptual Analysis and Relational Analysis is preferred in this research.

The interviews and policy documents help to answer the sub questions by providing data. After answering all the sub questions and looking at all the indicators the main research question *“What is the effect of geography on the relationship between governance capacities and green space policy by local governments?”* is answered.

5 Local government cases

5.1 Nijmegen

Nijmegen is a city located in the south of Gelderland and borders the Waal River. It is one of the oldest, if not the oldest, city of the Netherlands and had 182.480 inhabitants in 2023 (CBS, 2023). While the city has a historic centre, it has modern urban sprawl and mainly expanded to the south.

In 2018 the municipality received the European Green Capital Award (Nijmegen European Green Capital, 2018). This is a reward for cities that strongly promote ecological, social, and economic sustainability. And Nijmegen received this reward because the municipality and other parties worked hard towards making the city greener and more sustainable. One of the ideas from 2018 is *“Operatie Steenbreek”*. This operation entails braking up paved areas for green space. In 2018, 190.000 stones have been removed in the city and replaced with over 10.000 trees and bushes. The focus points in this project are 1) biodiversity 2) climate adaptation 3) social cohesive and 4) health.

Now, *“Operatie Steenbreek”* even gives out their own prize. Called the *“Steenbreektrofee”*. Winners are from all over the country: Zevenaar, Harderwijk, Leiden, Den Haag, Hoornsemeer in Groningen and Parkstad Limburg among others.

To keep their fame high as European Green Capital the municipality continues investing in green space development. For example, Nijmegen Noord, a neighbourhood called Lent. This neighbourhood is a nature inclusive area where green space is used, not only for biodiversity, but also for the wellbeing of residents (Van Berk, 2023). There is also a programme called the Groene Metropoolregio. Groene Metropoolregio Arnhem-Nijmegen supports municipalities in realising future-proof housing. Housing that incorporates nature and landscape, quality of life and economic aspects (Groene Metropoolregio, 2023). We help municipalities do this through knowledge sharing and cooperation in a public-private network. We also deploy regulations, financial resources and the network of the province of Gelderland and the central government. Finally, we bring public-private investments together.

5.2 Arnhem

The other part of the Groene Metropoolregio is Arnhem. A city located to the north of Nijmegen and borders the Rijn River. The city counted 165.770 inhabitants in 2023 (CBS, 2023). The city is closely connected with the nature reserve Veluwe and thus has a long history of green space. This can be seen by the many trees present throughout the municipality.

The municipality's website offers easy applications to make neighbourhoods greener and climate resistant (Gemeente Arnhem, 2022). Most initiatives are by residents, they come up with their own ideas.

In 2015 the organisation "Groen Arnhem" emerged, because of a demand for green initiatives (Groen Arnhem, 2022). This organisation shares knowledge, tools and man hours to make green initiatives more efficient. An initiative called "Boom Kwaliteitsteam Arnhem" has the ambition to make the city attractive and healthier with the use of trees. The trees help overcome the negative effects of climate change. The initiative also works in close connections with the municipality Arnhem. They use the tree plan as a starting point for their actions and they prefer long term goals over short term goals.

5.3 's-Hertogenbosch

's-Hertogenbosch is the capital of the province of North Brabant. It is also the main city of the municipality of 's-Hertogenbosch. The city is also called Den Bosch, or Swamp Dragon. The latter nickname has survived the city's role in the Eighty Years' War. Back then, 's-Hertogenbosch was a fortified city surrounded by swamps such as the Bossche Broek and the Moerputten, which made the city considered impregnable. As early as 1184, 's-Hertogenbosch has had city rights. And its municipality now counts 158.753 inhabitants, making it the 4th largest city in North Brabant (CBS, 2023).

Also, within the municipality of 's-Hertogenbosch are Bokhoven, Deuteren, Dieskant, Empel, Engelen, Gewande, Heeseind, Hintham, Kruisstraat, Maliskamp, Meerwijk, Nuland, Orthen, Oud-Empel, Rosmalen and Vinkel. The city is part of the BrabantStad metropolitan region, an area with about 1.8 million inhabitants. Via the east, the city directly is connected by the A59 to Oss, Nijmegen and Arnhem.

As the nickname Swamp Dragon suggests, the city is surrounded by water. The city lies on four rivers, the Maas, the Aa, the Dommel and the Dieze. The connection with the landscape and the water, the historical characteristics and the strong reciprocal relationship between the city and the outside area are eminently reflected in the relationship between the inner city with the historic fortifications and nature reserve Het Bossche Broek (Koersdocument Omgevingsvisie, 2022). The quality of this beautiful hard city edge is unique for the Netherlands: flanked by the nature reserve, the inner city is the bustling midpoint.

5.4 Wijchen

Wijchen is a village south of Nijmegen. The municipality has a large blue structure throughout the village, even though it does not border any rivers. In 2023 it had 41.537 inhabitants and there prevails a more rural sense (CBS, 2023). The village is almost directly connected with Nijmegen in the north. But an industrial site and a green stroke make the border clear. The rest of the village is surrounded by agricultural lands, forests and nature. Recreation area the Berendonck is popular during hot summer days for residents to cool down.

Recently the village has expanded south. This neighbourhood, called Huurlingsedam, is now in its 3rd phase. In total 250 houses are built, all in a, what looks to be, a green area. At the same time the municipality has made a climate adaptation action plan (Gemeente Wijchen, 2022). This plan focusses on stimulation residents to make their gardens greener and manage their own rainwater. The goal of this plan is to increase visibility of what the municipality is doing on climate adaptation, and to get residents to make their own climate adaptive choices.

On top of that the municipality has implemented a Green-Blue framework and the building blocks of the Groene Metropoolregio (Gemeente Wijchen, 2022). They claim to be able to build more housing without it being at the expense of a green living environment, by building taller residential buildings than before. There is no hard height limit for building projects, but they look at project level what is appropriate and possible to achieve good and varied neighbourhoods. Where possible Wijchen will opt for infill development over expansion. In doing so, the municipality is careful with their existing greenery in the neighbourhoods and their natural and outdoor areas that they want to keep green.

On the 13th of May 2023 a green market took place in the centre of Wijchen. Here the municipality kicked off their campaign “Een groener Wijchen”. People can trade a brick for a plant. And everybody that was present could win one of ten rain barrels.

5.5 Oss

Oss is a city in North Brabant and has a large municipality in terms of surface area. The city counted 94.437 inhabitants in 2023 (CBS, 2023). Recently the surrounding municipalities merged into the municipality of Oss, because they were too small to keep existing. All these small municipalities had many rural characteristics. Former Geffen, Lith, Megen, Ravenstein and Herpen make Oss a large, mainly rural, municipality.

The municipality has the ambition to be climate robust in 2050. Meaning, they want to be resilient to heavy rain, heat and drought according to the Deltaplan Ruimtelijke Adaptatie (Gemeente Oss, 2023). They also use “Operatie Steenbreek” to stimulate green space over bricks and pavement. And continue to use this initiative among others. On top of that the municipality of Oss made a tree plan to plant around 350 trees.

On top of that the municipality is increasing biodiversity in their environment. The number of plant and animal species is still decreasing, also in Oss. Air quality is not always good and climate change is causing wet and dry periods. This calls for extra attention to greenery and nature. These help residents of Oss better to cope with the negative consequences of humans and climate change, both in the rural and urban area. The municipality of Oss states that an attractive, varied green environment with many different plants and animals is also pleasant to stay in, to recreate in and to enjoy (Gemeente Oss, 2023). This has led to ambitions in line with the Green and Blue Nature roadmap, for example, ecological roadside management, nature and ecology in the city and in the polder and the Hertogswetering ecological zone. In this context Oss is looking at opportunities to integrate nature-inclusive building more into building projects and initiatives.

5.6 Gennepe

The municipality of Gennepe too is located bordering the Maas River in the province of Limburg. The municipality counted 17.771 inhabitants in 2023 (CBS, 2023). The municipality consists of the villages called Aaldonk, Dam, De Looi, Diekendaal, Hekkens, Smele en Zelder.

The municipality identifies with a rich and social history. Landscape wise, the area is unique in the Netherlands since the last ice age. As a result, water is the structuring element throughout the municipality. And this has provided natural and ecological values. The diversity in landscape, dry to wet, high to low, sand to clay, ensures an ecological mix.

Agriculture is putting pressure on these natural and ecological values. Striking open field clearings, old farmland near the villages and the varied Maasheggen landscape are a striking part of the historic landscape. Together with the contemporary agricultural businesses they shape the rural area. The agricultural landscape in Gennepe is called historic.

All in all, the municipality has many rural characteristics. The main differences are divided spatially in seven areas: Niersdal; Maasdal; Rivierduinen; Open agrarisch landschap; Overgangszone; Stichting Dichterbij: Baksteenfabriek Milsbeek (Gemeente Gennepe & BügelHajema, 2023).

6 Results

In this chapter the most important findings of the research will be presented according to the research concepts, which can be seen in *chapter 3 Conceptual framework*: 1) green space policy; 2) stewarding capacity; 3) unlocking capacity; 4) transforming capacity; 5) orchestrating capacity. To do this, all data from different data collection methods are used. These include interviews, documents, email and media. To make matter clearer, the municipalities are mentioned in the same order during the results chapter. First, the results of the green space policy concept are shown. Second, the capacity concepts are shown. Each with a summary to give a solid overview. At the end of each capacity chapter (chapters 5.2, 5.3, 5.4, 5.5) there is a conclusive summary that presents the results in short. Third, in *chapter 5.6 Discussion* the Conceptual and Relational analysis are presented. Here the research concepts are scored.

6.1 Green space policy

In the table below the concept '*Green space policy*' is presented. First, the word count is presented per municipality. In this table words that indicate green space are targeted. This includes "*groen*", meaning green, because it pops up for multiple relevant concepts as "*vergroenen*", "*vergroening*", "*groener*", "*groene*" etc. Second, the presence of a climate adaptation policy. Third, the presence of green space rules and last the presence of '*Operatie Steenbreek*'.

Municipality	Word count " <i>groen</i> "	Climate adaptive policy	Green space instruments	' <i>Operatie Steenbreek</i> '
Nijmegen	310	Yes	Groennorm 3-30-300	Yes
Arnhem	904	Yes	Groennorm Point system 3-30-300	Yes
's-Hertogenbosch	421	Yes	Green roof subsidy Groennorm ordinance	Yes
Oss	520	Yes	Groennorm	Yes
Wijchen	151	Yes	no	Yes
Gennep	234	no	no	Yes

(Table 9)

A couple of interesting results are visible. To start, the word count "*groen*" differs between the municipalities. Overall, it is clear that the urban municipalities (in blue) have more word counts than the urban municipalities (in green). However, Oss on itself has more word counts compared to Nijmegen and 's-Hertogenbosch. Thus, Oss does not fall short of Nijmegen and 's-Hertogenbosch. Arnhem has more word counts than any other party involved. Gennep and Wijchen have the least word counts.

One explanation of the previous result could be that the Gennep has no current climate adaptive policy and Wijchen has no current spatial plan. As a result, these municipalities are effectively missing relevant documents. But this is not characteristic of rural municipalities since Oss does have climate adaptive policy.

The green space instruments vary between the municipalities. Arnhem has the most specific instruments followed by Arnhem, Nijmegen and Oss. Wijchen and Gennep have no specific green space instruments. Gennep does have alternative instruments that no other municipality has, but this does not apply for green space.

The table above shows that there is a difference in green space policy. Specifically, between Nijmegen, Arnhem, 's-Hertogenbosch and Oss on the one side and Wijchen and Genneep on the other side. The latter two have no active climate or sustainability policy or vision to enforce. But they are working on it as we speak. This hints at what a Genneep employee mentioned. Smaller, often rural, municipalities will wait for bigger, often urban, municipalities to finish their policy and vision documents. Then, the smaller municipalities can take the finished documents as inspiration and guidance. So, they don't have to "*reinvent the wheel*".

The finding that there are differences between the rural and urban municipalities are to be expected from the explored literature (Bishop & Cushing, 2008; Johnston, Manley, & Jones, 2016; Rodden, 2019; Jennings & Stoker, 2016; Maxwell, 2019). But it is not to be expected that rural municipalities get inspired by urban municipalities, since most of the literature highlights the divergence in political attitudes between rural and urban areas. Also Cramer (2016) states that rural inhabitants are more conservative and nationalistic compared to urban inhabitants. So, based on these authors it is to be expected that rural municipalities are not inspired by urban municipalities in political views. But, Huijsman et al. (2021) states that, specifically, in the Netherlands the divergence originates from large cities, the strongest divergence originates from inner cities of large metropolitan areas. In the Netherlands these areas would be located in the Randstad area. Therefore, the urban cases in this research might not be '*urban*' enough to see such an effect.

6.2 Stewarding capacity

The stewarding capacity affects which disturbances are predicted, how they are anticipated and what actions are made possible. To know this, national, regional and international programmes and partnerships supporting knowledge for generations is needed. Because it creates a vast knowledge about future climate-related risks and vulnerabilities. The capacity consists of the following indicators: participatory visioning processes, availability of scenarios, maps and risk assessments. These indicators will be mentioned respectively in the following chapter.

6.2.1 Stewarding capacity in Nijmegen

6.2.1.1 Availability of scenarios

The 'Rapportage klimaatstresstest' presents a 2050 city scenario. The temperatures, warm nights, water and precipitation and droughts are explored. These future climate scenarios are also present in their vision documents. Meaning, the municipality has vast knowledge about future climate-related risks and vulnerability.

6.2.1.2 Participation

At the moment the city has ambitions on a range of different projects, not one with the highest priority but multiple with the same priority. One could say Nijmegen is not making decisive choices in their policy direction and is trying to keep all parties happy, doing a little for everyone.

One way of making such choices it by using participatory visioning processes. Here the municipality tries to listen to their inhabitants and try to draw a vision together. Since 2020, Hartje Nijmegen has been making the city centre more attractive, cleaner and greener. This is done according to an action plan that has been made together with residents, visitors and entrepreneurs. Because many ideas have already been realized in recent years, the municipality asked for new ideas for the city centre at the end of 2022. With the current action plan as a result (only the green projects are presented):

- 1) Walking park - a park that will be moved through the downtown area. This is how we find the ideal place for greenery and seating areas.
- 2) Greening Mariënborg Square - we are investigating how to green this stone plain in a beautiful way.

3) Roman plants - by cargo bike we want to introduce admirers and visitors to the city centre to Roman flower and herb plants.

6.2.1.3 Maps

In the case of Nijmegen maps are also presented in the Omgevingsvisie. First, they show the current and future urban green structure, which consists of all green areas in the city. This includes parks, forest and natural areas, recreational areas estates and agricultural areas. Second, they show avenue structure at spatial carriers. And the historic roads and main roads are all given a green character in Nijmegen. Third, they show movement routes for informal routes through the neighbourhoods for pedestrians and cyclists. They connect the neighbourhoods and provide access to the surrounding landscape.

On top of that, the Omgevingsvisie and Klimaatadaptatie Strategie of Nijmegen also contain maps about climate adaptation. These maps show detailed areas of concern during peak downpours, flooding during high water, watershed approach combined with urban development, heat stress and shade. Mainly the Klimaatadaptatie Strategie contains maps that are precise and extensive showing water flow systems and structures. Meaning, the municipality is aware of the climate change challenges and where they might occur in their municipality. Helping the city planners to identify city transformation precisely.

In addition to the previous documents, maps are also used in the Bomenplan (tree plan) and Klimaatstresstest (climate stress test). Here the maps are filling the role of a database and contributing knowledge to climate change when updated, for example, the green percentage in each neighbourhood and the main tree structure. Hölscher, Frantziskaki and Loorbach (2018) describe this as a sub sub variable for the stewarding capacity at local government level.

6.2.1.4 Risk assessment

Risk assessment is presented in combination with climate change. Risks to the current way of living and the water infrastructure. Yet, there is little written about risks and dangers. Most of the visioning documents are about opportunities and chances, the risks are therefore not mentioned as such. But they are acknowledged in the documents. Even the existence of the documents itself can be seen as awareness to risks.

6.2.2 Stewarding capacity in Arnhem

6.2.2.1 Availability of Scenario's

The Arnhem 'omgevingsvisie' mentions the use of scenarios in their vision development: *"Using three scenarios and a number of propositions, we collected opinions from the city gathered"*. Participants left their opinion, and the municipality of Arnhem integrated the outcome in their vision development.

In addition, the 'omgevingsvisie' uses the Wageningen University & Research scenario. Which uses Arnhem as an example for a future city (WUR, 2022). Later in the 'omgevingsvisie' the importance of the use of scenario's is discussed. Regarding the city centre. It is clear that the municipality understands that the city centre should be sufficiently flexible and agile to accommodate different developments. The municipality ensures the city centre as a place to live and work and it has to be connected with special facilities and areas around the city centre. For example, green space the Veluwe.

However, no where it is mentioned what the three scenarios used in the vision development entailed. On top of that, there are no distinctive scenarios explained or portrait in the vision document. The 'strategie klimaatadaptatie Arnhem' does offer different scenario's regarding climate change. Specifically, water, heat and drought are their focus points, and these scenarios contribute to research on climate adaptation.

6.2.2.2 Maps

The 'omgevingsvisie' possesses multiple maps of the municipality of Arnhem, each with their own theme: the city embedded in parks and landscapes; different spatial environments; landscape typologies; green-blue surfaces in Arnhem; green-blue lines in Arnhem; heat stress in Arnhem; water in Arnhem; living environments in Arnhem; area developments of Arnhem.

In addition, the 'strategie klimaatadaptatie Arnhem' and the 'groenvisie' possess multiple maps: relevant climate topics; green vision map; basic schedule trees, roads, verges; grand ambitions. Especially the green vision map is interesting. Because it is paired with an extensive legend that provides characteristics and design principles. This map contributes to regional knowledge and partnerships since it relevant for the entire region, not just for the municipality of Arnhem.

6.2.2.3 Participatory visioning

Residents, entrepreneurs and organisations of Arnhem have contributed ideas on the environmental vision. Over 3,500 people responded online to 18 propositions and three scenarios. Professional parties participated via a sounding board network with meetings. Secondary school students made a presentation on how they want to see Arnhem in 20 years. This participation had an impact: the environmental vision was adapted and fleshed out in a number of aspects based on input from the city. For example: more attention to nature, meeting and exercise in street and neighbourhood design, high-rise buildings in easily accessible places, the level of facilities in the neighbourhood (what should be close by, what can be further away) and a well-considered mix of means of transport such as bicycle, bus and car. The administrative and social partners have also been able to contribute to the environmental vision and have made their contribution to the objectives and solution directions when it comes to the development of Arnhem.

On top of that, the residents of Arnhem are able to talk along with the green investments of their local government. 'Groenvisie': "*civic participation is high on the agenda with neighbourhood specific attention*". The residents of Arnhem will have more say over green spaces. It is important to be clear about how the city wants to deal with their green spaces. The groenvisie provides the framework for that. It will also tie in with the Environment Act, which will be developed later, and the 'groenvisie' elaborates on the province's nature and landscape policy.

6.2.2.4 Risk assessment

Risk assessment is presented in the Strategie klimaatadaptatie Arnhem. In here risks about the liveability of Arnhem is discussed, safety, health and economy are threatened by the climate and the city needs to be mitigated and adapted to these threats for the next 10 years.

To prepare for these risks there is a national programme: Deltaprogramma risicobenadering. This means that everyone in Netherlands have the same level of protection with extra attention to those areas where there may be a high number of victims and/or major economic damage. The new approach is based on risk: the probability of a dike breach in relation to the consequences of that breach. One of the tasks is already clear: reconstruction of the Rijnkade near the city centre. This will have a significant impact on the city centre and its spatial development, and thus opportunities for green space investments.

In addition, the Arnhem climate adaptation strategy consists of a risk dialogue. It is step two in their eight-pointed strategy. This helps the city to get a better understanding of the situation and to work out a specific plan.

6.2.3 Stewarding capacity in 's-Hertogenbosch

6.2.3.1 Availability of scenario's

The 's-Hertogenbosch 'Beleidsplan' states that during times of heat, babies, outdoor workforce, exercisers, festival go-ers and patients are exposed to dangers. They find their origin in public health.

Next to the 'Beleidsplan', the 'Bomenbeleidsplan' is also linked to public health. Not only for their citizens now, but also in the future: "*This lays the foundation for greenery for future generations*".

Here the municipality displays the role of greenery in the future and how to ensure of green spaces that can benefit public health.

Other than, the municipality of Den Bosch is clear about what they want, regarding green space, and how to achieve this goal. However, there is little attention to different scenarios. There is only one road to follow and no attention for possible different scenarios.

6.2.3.2 Maps

The 'Koersdocument Omgevingsvisie' has illustrative maps about the watersystem in the Den Bosch area. This system responsible for the current water structures and water ways in the municipality and leading to the municipality. Unique landscapes have followed and are named: Sprokkelbos; Binkelse Zandgronden; Dungense Polder; Diezemonding; Rosmalense Polder. Den Bosch puts a lot of pride in their landscapes and its historical foundations that date back to the year 200.

The 'Beleidsplan' uses multiple maps to illustrate what and where extreme weather events can have impact across the municipality.

The 'Bomenbeleidsplan' presents the most detailed maps about its greenery and its city limits. This is done in cooperation with the Cobra-Groeninrich. The same organisation that is providing data about green spaces and petrification rates for Operatie Steenbreek. Which is also active in Den Bosch.

6.2.3.3 Participatory visioning processes

Participation is present and a returning factor in the 's-Hertogenboch policy. The 'Koersdocument Omgevingsvisie' functions as a means to open up discussion with partners and inhabitants. And since it is a concept, the document content can still be altered after discussions. Only when such discussions have taken place, the definitive heading is envisioned.

On top of that Den Bosch aims for a good balancing of interest in urbanisation. Much of the implementation programme focuses on cooperation, participation and communication. In terms of participation, the 'Omgevingsvisie' is leading.

In addition, the same goes for the Den Bosch tree plan. The 'Bomenbeleidsplan' states that the inhabitants are taken along in their visioning processes on neighbourhood level. *"Citizens are sought out in the neighbourhoods and together determine what greenery is important in their neighbourhood and how it is best protected"*.

The Den Bosch municipality works together with stakeholders to form a vision about the city's future. It does not only consult the stakeholders, but the process takes everyone along from the very start. Even in formulating the definitive vision document, meaning that 's-Hertogenbosch takes it participatory visioning process seriously.

6.2.3.4 Risk assessment

As mentioned before the 'Beleidsplan Groen en Klimaat' brings the extreme weather possibilities to light. This is linked to people's and animals' health. Other than that, no clear new risk assessment can be found in the data.

6.2.4 Stewarding capacity in Oss

6.2.4.1 Availability of scenario's

The municipality of Oss points out that there are future scenario's possible with flooding, heat and drought. This poses risks to the economy, to our health, to nature and to our safety. As a result, Oss has summarized measures aimed at dealing with the consequences of climate change under the term 'climate adaptation'. Examples are reinforcing the dykes, collecting water after heavy showers and more water and greenery in cities and villages against heat.

On the other hand, the municipality of Oss uses valid scenarios from the KNMI. Insights into what exactly climate change means are still being researched and updated based on new insights. Oss starts from the 'climate scenarios' of the KNMI from 2014. These are revised periodically on the basis

of scientific research. Thus, new scenarios will appear at the end of 2023, at which point their policy can be updated. Additionally, the municipality uses the worst-case scenario's regarding flooding. But not regarding heat. Whether this is due to a lack of information or otherwise is not clear.

6.1.4.2 Maps

The Oss' document 'Koersnota Klimaatadaptatie' is to give direction in their climate adaptation goals and efforts. It is not a definitive document that states all their motives and practices. Here one might expect little information to leave doors open, but the documents have multiple extensive maps.

The documents presents maps of the following: distribution of landscape types; Water depth for a shower of 60 millimetres in one hour; Risks of flooding in properties during a 60-millimetre downpour in an hour; Risks of impassable roads during a 60-millimetre downpour in an hour; Wind chill one day; Heat and loneliness map Oss; Change in average groundwater level future climate; Maximum water depth in case of flooding (protected area) and vulnerable objects.

The most striking map is the map that connects heat and loneliness. This shows a real understanding of the strengthening effects between certain phenomena. It also shows the municipality's care. As presented in figure 7 on the right.

6.2.4.3 Participatory visioning processes

In recent years many sub-topic decisions taken by the municipal council was intensively discussed with stakeholders. Working together with all kinds of parties from within and outside the municipality and the participation continues in all kinds of follow-up processes. For example, the water safety project Meandering Maas, energy generation, the future prospects for agriculture in the Oss municipality, vacant agricultural buildings, zoning plan outlying area 2020, expansion locations for housing, recreation and tourism, heritage, nature development, the Maashorst, the Clean Air Agreement and circularity.

To go further the 'Stadjes en kernen' document states that vital communities require modest government and other forms of participation. The municipality of Oss invites new groups to get involved in and speak out about their living environment. Furthermore, the municipality strengthen dialogue with society by supporting (groups of) initiators in the way that helps them to take matters into their own hands: sometimes facilitating, often referring, advising or in other ways.

Later, the document 'Stadjes en kernen' presents their vision forming practices. It is a first exploration. In fact, the frameworks for participation and resident initiatives are now being worked out in a broad vision on participation (from the Administrative Order on Participation) and a vision of the Osse social base and community-oriented work. The role of the neighbourhood and village councils in strengthening the communities is also reviewed together.

In the end, the document states what else is needed. "Giving residents more control over that living environment of the future". In that, this vision does represent a break with the past. It is an initial impetus for even more and more sustainable participation: consultation between municipality, residents and entrepreneurs; cooperation, each from its own role. And from the social values Oss wants to protect. Such as meetings between stakeholders, participation, but also other forms of sustainability. For example, climate adaptation and safe living environment.

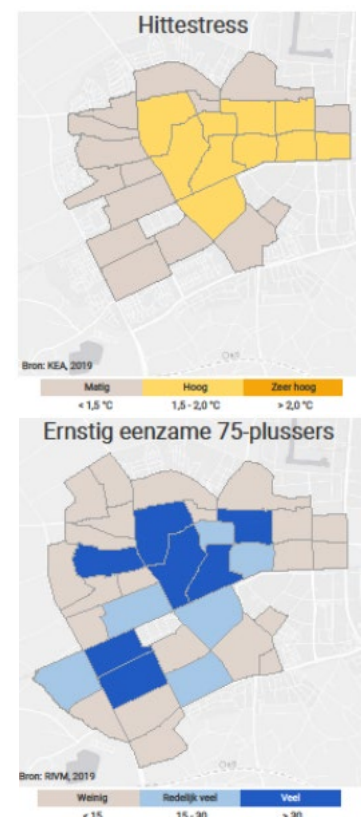


Figure 7, Heat and loneliness map Oss (Koersnota klimaatadaptatie 2050)

6.2.4.4 Risk assessment

To identify where in Oss there are the greatest risks of climate flooding, a regional stress test was carried out in a regional context. This revealed how vulnerable the territory of Oss is. Apparently, it is vulnerable to extreme precipitation, heat, drought and flooding. The 'Koersnota Klimaatadaptatie' contains a box with the main findings of the stress test.

In addition, the municipality of Oss has different strategies in spatial planning for their different regions: urban area; vital outdoor area; towns and villages. These three regions have their own, more specified, strategy. And different risks are proposed in each region.

The 'Visie stedelijk gebied' for example, starts off with the general climate risks of heat, water, and drought. Later, the document goes into more specifics regarding to their strategy "*prevent and protect*" helps mitigate the region-specific risks.

6.2.5 Stewarding capacity in Wijchen

6.2.5.1 Availability of scenario's

The 'RAS', or Regional Adaptation Strategy, gives options what to do in certain scenarios. For example, the following question is answered in the document: "*What to do in a wildfire?*". This shows that the municipality thinks about different scenarios that can occur within the region. But the document does not present or explores scenarios further. Showing a lack of the availability of scenarios by the municipality.

6.2.5.2 Maps

The municipality of Wijchen has no climate adaptation or mitigation policy yet. They are working on it as this research is conducted. Therefore, an important part is not available. Luckily, other documents provide similar information that can be expected to be used in the future Wijchen climate adaptive policy document.

The 'RAS' presents 6 themes: Green blue city, green blue villages; Ready for heat; Future resilient rural area; Anti-drying-up offensive weirs; Safe, vital and vulnerable functions; Co-creation of a climate-proof Rijk van Maas & Waal. The page is accompanied with, the only map of the document, which presents the municipality, but no integration of the themes or any other information.

6.2.5.3 Participatory visioning processes

The document 'strategisch kompas wijchen 2035' presents the municipal's future vision. It reflects Wijchen's direction on which they are working on in the coming period. It forms a review framework for future policies, and it gives direction.

In the first phase, a digital image bank was set up, where Wijchen residents, from home, have been able to give input on various themes give input on the future of Wijchen. In addition, the municipality organised six, so called, "*future tables*". At these future tables' residents, entrepreneurs and partners shared their ideas and dreams about the future of Wijchen with each other. The third component was the pupil dialogue, in which young people from the Maaswaal College (high school) gave their ideas about the future of Wijchen were given. The main outcomes of this first part of the interactive process were shared with the college, council and society.

After the municipal elections, the second part of the interactive process took place. Including a children's mayor meeting, a youth café and a village tour, during which 11 cores and neighbourhoods were visited. Supplementary, the municipality organised another day with the city council and an entrepreneurs' meeting. Ultimately, they weighed all input and incorporated it in the policy document analysed: 'raadsversie strategisch kompas wijchen 2035'.

These two participation phases show how the community of Wijchen is connected and involved in the municipal visioning process. This way, the vision contains vast knowledge that previously was locked in the community. Making a more realistic and encompassed vision.

6.2.5.4 Risk assessment

The document 'RAS' states the risks of drought, heat, water and flooding. To acquire this knowledge the municipality has executed stress tests. Meaning, that the municipality contributes to research on climate adaptation. Based on the regional stress tests conducted in the regional climate impact atlas and risk dialogs, it has been concluded that the region is sensitive to very sensitive to all climate effects. These effects have their effects in a very wide variety.

6.2.6 Stewarding capacity in Genneep

6.2.6.1 Availability of scenario's

The municipality of Genneep presents no clear scenarios in their policy documents. They address that climate change is bringing big changes for public green spaces and our living environment with it. For example, drought stress and flooding, where the municipality will increasingly face with longer periods of drought, heat stress and driving rain with heavy rainfall in the short term. The current design of public spaces is often not geared to this. Concluding, that the extreme climate events can have impacts. However, no more detail is given. Similar in the case of the municipality of Oss.

6.2.6.2 Maps

The spatial vision of Genneep has multiple maps: positioning municipality Genneep; identity map Genneep; sub areas; dynamic Maasdal; Niers entertainment; rural embraced by nature; adventurous river dunes; the cores; spearhead map; culture rich Genneep; powerful Genneep; high, dry and safe Genneep; Genneep connected with each other; area classification.

All available maps are from the Genneep spatial vision. None are from the climate policy. This indicates that the main focus of Genneep is not on the climate adaptation itself, but more on spatial quality in the municipality. Illustrated by the map in figure 8 below, in the green "High, dry and safe".



Figure 8, , Speerpuntenkaart Genneep (Omgevingsvisie Genneep).

6.2.6.3 Participatory visioning processes

The document 'Groener Gennepe, Groenbeleidsplan 2021-2031' describes the residents' completion of a digital questionnaire, providing the municipality with input in the drafting of this green policy plan. In response to the digital questionnaire, responses from residents about the management and maintenance and the quality of the design of the green outdoor space are highly variable. As a result, the municipality will take the respondents' remarks along in their policy making.

The making of the spatial vision of Gennepe, 'Omgevingsvisie Gennepe', also used participation. More specific, spatial quality needs to be in line with the community. The municipality of Gennepe wants to work 'together' with the inhabitants and entrepreneurs or the partners to make and to keep physical living environments of the municipality future-proof. Which is compiled in the spatial vision. Showing how the municipality of Gennepe worked together to make their spatial vision.

The current spatial vision of Gennepe is meant to look into the future for the coming 15 years. This, however, does not mean that the municipality and the community can stop thinking about the future for the next 15 years. Future building is a continuous process. As the municipality puts it: "Visioning, therefore, never stops". And Gennepe will continue to be visioning.

6.2.6.4 Risk assessment

The Gennepe spatial vision presents varied information of aspects. One aspect focusses on "high, dry and safe Gennepe". In this chapter it is made clear that there are the following goals to limit certain risks:

1. "We make adequate provision for both high water levels and periods of drought. We focus on preventing these and counteracting the negative consequences"
 - Investigate which problems Gennepe faces in flooding and drought
 - Investigate which measures for flooding and drought are appropriate
 - Equipping the municipal organisation to deal with sustainability issues integrally
 - Adopt a sustainable approach as early as the planning stage of new initiatives
 - Continue to disconnect rainwater from the sewer system
 - Encourage (agricultural) entrepreneurs to make their business operations more climate-proof.

This goal and its sub goals make clear that there are risks regarding flooding and drought, planning water drainage and climate proof venture in Gennepe. Unique in this risk assessment is that there is a direct direction to action. It is clear what the municipality will do in preventing and counteracting.

6.2.7 Stewarding capacity in short

One aspect is not mentioned before because it is so similar for all municipalities. This is the fact that all municipalities have national, regional and international partnerships to support knowledge. Some are even partners of each other or in the same regional partnership. Other than that, sub variables *availability of scenarios, maps* and *risk assessment* are relatively the same. However, the sub variable *Participatory visioning processes* varies most between the parties.

In Nijmegen stewarding is mainly addressed in relation to the anticipation and possible actions that are explored by the availability of scenarios, maps, participation and risk assessment at local government level in Nijmegen. The maps and risk assessment add to knowledge about future climate-related risks and vulnerabilities. However, there are two shortcomings to this stewarding capacity.

First, the participation is not as Hölscher, Frantzeskaki and Loorbach (2018) identified and therefore the municipality of Nijmegen lacks on this indicator. Meaning, there is no participatory visioning process present in Nijmegen, only a participatory retrieval process as described in Hartje Nijmegen.

Second, the availability of scenarios is lacking in policy documents. Only the brief explanation of what can be expected of climate change within 50 years is described in various documents, but they

don't portray a clear or varied scenario. This makes it hard to generate accurate and specific policy. The result is a general plan instead of specific plans for certain situations.

In Arnhem stewarding is mainly addressed in relation to resident, entrepreneur and organisation participation. However, these stakeholders will not be able to contribute to the visioning of the 'groenvisie'. They will only be able to contribute to the development of plans. Therefore, this does not suffice for participatory visioning, just as in Nijmegen. It only suffices for participation as a whole. In addition, stewarding is addressed in relation to risk assessment via the 'Deltaprogramma risicobenadering'. Resulting in vast knowledge about future climate related risks and vulnerabilities.

In 's-Hertogenbosch stewarding is, firstly, addressed in relation to public health. Their available scenarios focus on green space in relation to public health but lack flexibility and the possibility of different scenario's. It is clear that the knowledge about future climate-related risks and vulnerabilities is present in 's-Hertogenbosch based on their risk assessment. But not based on their availability of scenarios.

Secondly, stewarding capacity is addressed in relation to participatory visioning processes. The 'Koersdocument Omgevingsvisie' functions as a means to open up discussion with partners and inhabitants. It does not only consult the stakeholders, but the process takes everyone along from the very start and it helps to create vast knowledge about future climate-related risks and vulnerabilities. Which is not seen in Nijmegen or Arnhem at the same level.

In Oss stewarding is mainly addressed in relation to participation. Firstly, the municipality has intensive discussions with stakeholders. However, the municipality had already decided how their vision would look like. Participatory processes entered later, after the vision was already formed to some extent. Meaning, just as in Nijmegen and Arnhem, the participation is not as Hölscher, Frantzeskaki and Loorbach (2018) identified.

Secondly, Oss has specified climate risk assessments for their three regions which results in customization. And their available scenarios point out what the negative effects of heat are, only they do not present different scenarios in detail. Even though it adds to knowledge about future climate-related risks and vulnerability.

In Wijchen stewarding is addressed in relation to participation. The municipality had started a participatory process to retrieve knowledge that previously was locked in the community. And it helps to collect knowledge about future climate-related risks and vulnerabilities. In addition, the municipality has executed a stress test meaning that they contribute to climate adaptation research. However, the data does not show a clear understanding of the available scenarios and only one map was present in the data.

In Gennep stewarding is mainly addressed in relation to a participatory visioning process that shows how the municipality of Gennep worked together to make their spatial vision. On top of that, Gennep is the only municipality that mentions this vision building as a continuous process that does not end when a spatial vision is completed. Meaning they are invested about the future and its climate-related risks. Their maps and risk assessment are also contributing to future climate-related risks. However, they lack the availability of scenarios in their policy documents.

6.3 Unlocking capacity

Unlocking capacity establishes what and how path dependencies and drivers of sustainability are identified and reduced. To do this a support network of key, political and civil society is needed. These parties are the actors to create conditions for change. The capacity consists of the following indicators: petrification rate and goals, support from the council and budget in euros. These indicators will be mentioned respectively in the following chapter.

6.3.1 Unlocking capacity in Nijmegen

6.3.1.1 Petrification rate and goals

The Klimaatadaptatie strategie (climate adaptation strategy) of Nijmegen identifies three main goals: green space percentage; shade percentage; cool spots. First, the average goal is to have 40% of green space in each neighbourhood. But this is not realistic in dense urban areas or high petrified areas. Therefore, the goal for the city centre should only be 35% of green space and for industrial sites the goal is to add 10% of green space. The map on the right shows the current petrification rates in the municipality of Nijmegen (Klimaatadaptatie strategie Nijmegen, 2022). On top of the percentages Nijmegen works with a maximum distance of 300 meters to a 5000 m² green space since 2013. As a result, new project plans since 2013 have integrated this norm. Second, important walking and biking routes should have a minimum of 40% shade during the hottest moment of the day. Less important routes have a minimum of 30%. Third, cool spots have to be within a 5-minute walk for each resident. This coincides with the maximum of 300 meters of a green space. However, a cool spot is defined by being at least 200 m² in a 1000 m² green space for the city centre, and 1000 m² in a 5000 m² green space in other neighbourhoods.

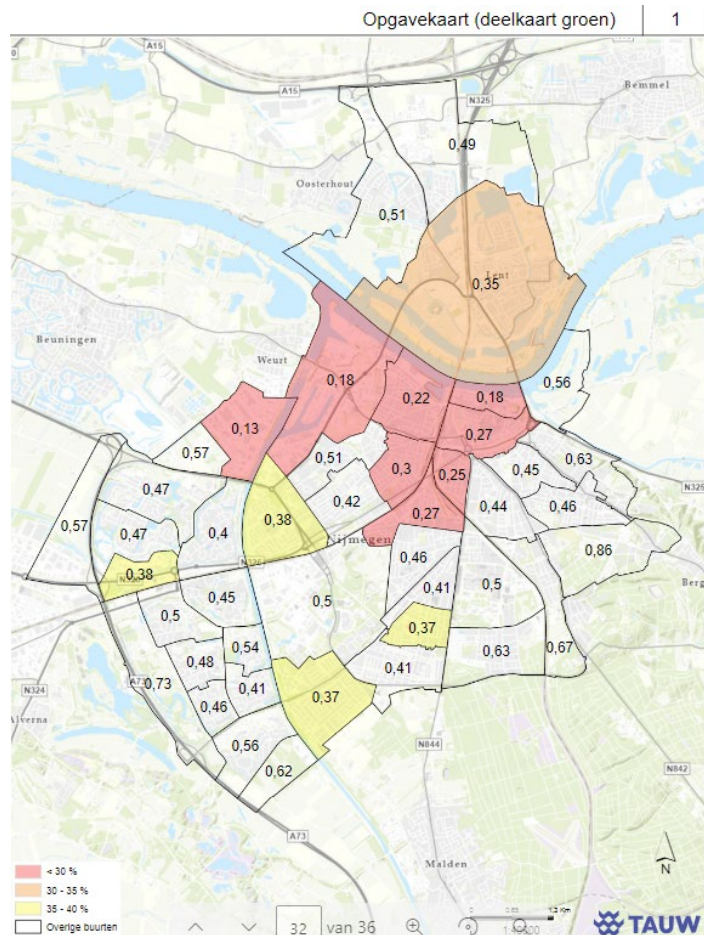


Figure 9, Percentage of green per neighbourhood in Nijmegen (Klimaatadaptatie strategie, 2022).

6.3.1.2. Support from the council

The college of mayor and aldermen is dominantly orientated to the political left in Nijmegen. As a result, there has been an increased focus on green space, among other things that come with the left wing. But this was not always the case. This changed at the moment when the Partij voor de Dieren (later PvdD) entered the previous Nijmegen college of mayor and aldermen (2018). Even though the PvdD played only a little role in the coalition.

The transition, to a more greenery thoughtful college, started with hot summers that literally show climate change in action. As a result, inhabitants raised questions about the lack of green grass. A twitter post by the local soccer club NEC was also published in the newspaper De Gelderlander with the title *“Goffert stadium is oasis within desert steppe”*. As shown, in figure 10, the local soccer club mocked the municipality for not being able to keep their park as green as the soccer field.

The politicians reacted by reviewing the policies regarding the upkeep of green space. However, the political game can reject rationally good motions. In Nijmegen one detail that did not fit with the political agenda was rejected and as a result the whole motion was rejected. Instead of adjusting the one detail. So, policy advisors do not only need knowledge about their speciality but also about the political climate and game that needs to be played.



Figure 10, “Hey @municipality of Nijmegen, would you like to hire @Theo van Benthum [Stadium manager]? (De Gelderlander, 2018).

6.3.1.3 Budget in euros

In 2023, the municipality of Nijmegen has budgeted 60 million euros in expenses for public space and 24 million in income to work on the following four ambitions (Stadsbegroting Gemeente Nijmegen, 2023):

1. We are a climate-resilient city where heat, drought and water nuisances are minimized, and biodiversity is promoted.
2. We have a green, healthy and vital environment to live, work and recreate in.
3. We are a circular city where we handle raw materials responsibly and reuse them as much as possible.
4. We are a sustainable and energy neutral city, where we support residents and businesses in the energy and heat transition and encourage sustainable resident initiatives.

6.3.2 Unlocking capacity in Arnhem

6.3.2.1 Petrification rate and goals

The Strategie klimaatadaptatie Arnhem contains a map named *“Hitte attentive kaart van Arnhem”* and it provides an overview of the areas prone to heating. This does not include the petrification rates, but it does address the problem petrified areas can have. Meaning, this document is directly focussed on their goals. The fact that these target areas have been identified proves that Arnhem has done research on green practices. And thus, putting in efforts to recognise and reduce drivers in petrification and non-green space.

One of the main goals of Arnhem is: improved health and well-being for residents by preventing and limiting heat islands. The groenvisie makes a distinction between goals per sub green area. Indicating custom made goals within the municipality of Arnhem.

6.3.2.2. Support from the council

Arnhem has always been a relatively green city, so has their city council always have been. Reason being, the Veluwe in the North of the city. At the moment the city council has become even more green with the addition of the Partij voor de Dieren (PvdD). Much attention goes to climate adaptation, greening of urban areas, and also work on nature and nature restoration. They have set the ambition to finalise their green goals within four years. Exactly one political period. Creating a window of opportunity and support a network of key political and civil society, actors to create conditions for change.

A new policy rule that is going into practice is the rule that within 300 meters of a dwelling should be green space. On top of that there is also budget for monitoring of biodiversity. Enabling quantifying biodiversity and greenery within the municipality. There is also a new green enforcement team to enforce the policies. All this adds to research on drivers of green space practices.

6.3.2.3 Budget in euros

Arnhem has a so called “*groenfonds*” and a “*klimaatfonds*”, respectively for green space investments and for climate adaptation investments. Both can be seen in figure 11 below. The GPR budget is reserved for water and sewage.

The budgets above are internal for the municipality. In terms of external budgets there are subsidies which variate between different topics, also for climate adaptation. Arnhem works on retrieving as much subsidies as possible.

Binnen de gemeente zijn de volgende middelen inzetbaar voor klimaatadaptatie:		
Groenfonds	200.000,-	Jaarlijks: voor meer groen ten behoeve van klimaatadaptatie waarvan 100.000,- voor planten van meer bomen en bossen (Bomenplan).
	50.000,-	Jaarlijks: bijdrage aan subsidieregeling ‘Initiatieven klimaatadaptatie’.
Klimaatfonds	pm	De hoogte van de bijdrage van het Klimaatfonds aan projecten wordt mede bepaald door de mogelijkheden voor cofinanciering. Deze worden de komende tijd in beeld gebracht.
	1.200.000,-	Eenmalig (2020-2022): voor extra maatregelen klimaatadaptatie voor verminderen wateroverlast.
GRP-budget	100.000,-	Jaarlijks (2020-2023): bijdrage Platform Arnhem Klimaatbestendig (tevens bijdrage beide waterschappen en provincie).

Figure 11, Municipal means for climate adaptation in Arnhem (Strategie klimaatadaptatie Arnhem 2020 2030).

6.3.3 Unlocking capacity in ‘s-Hertogenbosch

6.3.3.1 Petrification rate and goals

The ‘Beleidsplan ‘s-Hertogenbosch Groen en Klimaat’ notes that petrified areas increase the urban heat island effect and block water retention. Thus, the municipality want to make petrified areas greener. However, their goals on this topic are not focussing on petrification, but on temperature and water. Therefore, the municipality is only addressing the areas that form health risks to their inhabitants or visitors.

‘s-Hertogenbosch has no policy on heat island, which are often caused by petrification. This is due to the lack of influence the municipality has on private property. In the public area the municipality has more power and can realise and enforce anti-petrification rules easier. As a result, the policy makers have made policy that influence petrification directly and indirectly. For example, there is subsidy for green roofs. A direct policy. And if someone has a green roof, they are not obligated to drain the water on their own land. Otherwise, if you have no green roof, you need to drain water on your own land. An indirect policy to combat petrification.

6.3.3.2. Support from the council

In realising their ambitions, 's-Hertogenbosch, expects to need more budget and financial capacity than is available, because there are so many goals. This requires choices regarding priorities. Which currently consists of D66, VVD, GroenLinks, Rosmalens Belang (local party), CDA and PvdA members.

The city council uses the following rule of thumb: *“smart response to the flurries of climate change”*. As a result, the city council’s decisions and focus is on a broad greening strategy and on the larger green structures and generic policy.

The alderman Green & Water is from the VVD, a right conservative party. This, however, has no influence on the 's-Hertogenbosch climate vision and investments. Climate goals are even sought-after by aldermen because they can be used to *“score points”* and become more popular.

6.3.3.3 Budget in euros

As stated above, the budget and financial capacity of the 's-Hertogenbosch municipality is not enough to achieve all their ambitions. To solve this, the ‘Koersdocument Omgevingsvisie’ mentions a so-called green fund in which money is saved to only be spent on green space investment. Such a green fund can function so that the importance of a diverse area is seen as a whole. Even cross-municipal areas.

The interview with a 's-Hertogenbosch policy maker states that there has been a lack of financial funds regarding their ambitions. Because there are so many ambitions, not because of the lack of money. But, as we speak, there is no financial short anymore. There is enough budget to do *“all sorts of things”* regarding green space investments.

6.3.4 Unlocking capacity in Oss

6.3.4.1 Petrification rate and goals

Certain areas of the Oss municipality area are prone to flooding after a heavy rain and other certain areas of the Oss municipality are prone to heat stress. *“The increasing petrification of public spaces, business plots and private gardens, at the expense of green space in built-up areas is contributing to more heat stress”*. To combat heat stress, the municipality has a couple solutions:

1) Realisation of green cool spots and cool structures along states and roads, or a tree structure in every street is preferred. For every resident, a pleasant cool spot is available within 300 metres from the home (5-minute walk) a pleasant cool spot is available (pleasant wind chill, min. 0.5 ha of green space in accordance with WHO standard) and accessible. These green coolness structures we connect as much as possible in new construction, redevelopment and existing buildings.

2) We provide sufficient shade on the part of the street where people walk, at the hottest time of day, taking into account the shade level in summer. Here we prefer natural shade (plants and trees) rather than architectural structures (e.g., canopies). The amount of shade on the total street and/or square depends on the slow or fast traffic and residential function.

3) We realise minimal paving to limit heating on summer days.

4) We use the albedo effect of materials to prevent heating as much as possible.

5) In a residential area, reduce heat during the night indoors by adapted construction that reduces heat stress.

6.3.4.2. Support from the council

The municipality of Oss’ city council consists, for over one fourth, of the Voor De Gemeenschap (V.D.G). Followed by the SP, CDA and the VVD. The, in general greener, parties D66 and GroenLinks are represented less in Oss.

Here, the V.D.G. party is representing the rural areas (V.D.G.) However, it is clear that some developments are not placed in the more densely populated region, which leaves no other alternative than building it in the rural areas of the municipality. For example, windmills. Still, the V.D.G. tries to appeal to a large part of the rural inhabitants and delay some developments.

On top of that, the D66 and GroenLinks have limited influence in the coalition. Therefore, one employee of the municipality of Oss expects it to be hard to achieve a *“greenery”* initiative because of

the disagreement within the city council. For example, the establishment of their climate adaptive policy. The official establishment took over a year, because the city council had multiple remarks. Even though, the climate adaptive policy was already agreed upon in a coalition agreement. For the policy advisors it can be hard to find the right tone to play. *“So, then you see that it then takes quite a long time to then apparently get the right tone”*. The policy advisors try to write politically, so ensure it appeals to all city council members.

Another example is the one of their tree and maintenance plan. This plan had no financial consequences and yet the city college rejected it. But there are also other greenery initiatives that have been accepted without much resistance. The tree structure plan in 2016 for example. In Oss it varies what greenery initiatives are accepted or rejected and is dependent on the city council and college members as well as the way the initiative is presented. In recent years, greenery initiatives have become less fruitful due to political diversion. But on the other hand, greenery has a higher priority on the agenda compared to a couple of years ago.

6.3.4.3 Budget in euros

The municipality of Oss has the following budgets regarding climate adaptation:

Topic	Budget in euros
Dyke reinforcement	2,6 mln
Climate adaptation	1,5 mln
Green fund	-

(Table 10)

6.2.5 Unlocking capacity in Wijchen

6.3.5.1 Petrification rate and goals

The municipality of Wijchen addresses heat islands and petrified areas together. Areas with heat islands and a lot of petrification have a higher priority. These are the reddest areas on the heat island map shown here in figure 12. As a result, a prioritization can be made in what neighbourhoods are first to be stimulated to their greenery of gardens and rainwater collection.

The main goal of the municipality of Wijchen is to facilitate green neighbourhood development. To realise this, Wijchen works with the green-blue framework and the building blocks of the Green Metropolitan Area in neighbourhood development. In the neighbourhoods they will create green-blue oasis' and they will develop water-resilience and climate-resilience so that we are better prepared for extreme periods of flooding and dehydration.

6.3.5.2. Support from the council

Since the local government organisation of Wijchen also works for Druten. This chapter will use an example that apply to Druten too. Since, they work in the similar organisation as explained in the theoretical chapter.

The Druten city council had the first initiative of realizing a climate adaptive policy. Rather than from the experts, the policy advisors. Often, these advisors advise the council on what is needed and what topics are underrepresented in policy. This shows the importance the climate has on the current political agenda. The same goes for biodiversity and ecology. It makes clear that the support network of key political actors is strong in Wijchen and Druten. This helps to create conditions for change in the climate transformation.

Bron: regionale kwetsbaarhedenkaart, RAS 2017.

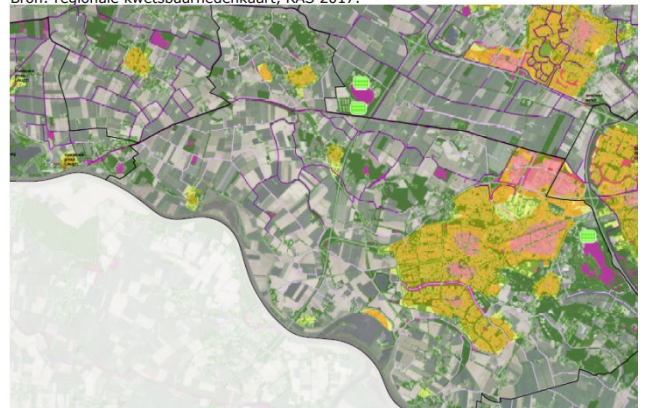


Figure 12, Temperature rates in the municipality of Wijchen (Wijkenstrategie, 2023).

Wijchen politics is in line with Nijmegen, since the two regions are closely related. The built areas connect and the inhabitant's interchange. In Druten people are less connected to Nijmegen. As a result, the political choices in Wijchen are more innovative and modern compared to Druten. One topic that is discussed most and has impact on green space, would be agriculture and nature.

6.3.5.3 Budget in euros

No current budgets regarding climate adaptation can be identified.

6.3.6 Unlocking capacity in Genneep

6.3.6.1 Petrification rate and goals

The policy document 'Groener Genneep Beleidsplan 2021-2031' reveals no petrification rates and little about accompanying goals. It is mentioned that plans need to take into account the petrification and sewage system to create an integral system that can retain water and that can drain water if needed. Later, the same documents mentions that the planting of trees require enough space to grow. Implying that petrification should be limited around the tree trunk. Other than that, there are no direct links to the topic 'petrification'.

Regarding petrification goals, the Genneep policy documents offer no direct goals. Indirect goals, such as heat stress, water drainage and biodiversity are included via the following notions:

- The municipality aims for a sustainable layout in which greenery fulfils various values such as amenity value and ecological value.
- The greenery at new construction sites is climate adaptive. The public green spaces offer space to collect rainwater that falls in the public area. The greenery is also heat-resistant and contributes to cooling by evaporation.

6.3.6.2 Support from the council

In Genneep the political situation is dominated by the CDA and the VVD. Nationally these parties are rather conservative in the eyes of climate adaptation and green space investments. However, there can be big differences between the national parties and their local counterparts according to a Genneep municipality employee. While the city council is not in favour of windmills, solar plants or even to have an active sustainability vision, they do invest time and effort in other climate innovative projects. The employees understand to think in terms of opportunities rather than restrictions.

Pragmatically looking with the parties where the opportunities are. "You have to play with the college, what do you score with and what don't you score with?" Keep the lines of communication short because you can achieve something with anyone, regardless of their political affiliation. Green gas is a good example. Helping the manure surplus and livestock with green gas, CDA and VVD think this is fine. The greener parties usually don't. But it does contribute to climate goals. Strategic thinking and how to get things done is very important, even in a smaller municipality like Genneep.

6.3.6.3 Budget in euros

No current budgets regarding climate adaptation can be identified.

6.3.7 Unlocking capacity in short

The unlocking capacity between the municipalities differs the most in content on their *Support from the council*. Reason being every municipality has a different political composition. But this does not mean that some municipalities have no support from the council, it just means that there is a different support network of political actors. Which all municipalities have. On result, there is a clear difference in the sub variable of *Budget in euros*. For some there is no mention of budget amounts.

In Nijmegen unlocking is mainly addressed in relation to clear petrification rates and goals. The municipality describes specific green percentages, distances to green spaces and shade percentages

that need to be met. Meaning, the municipality puts much effort to recognise and reduce drivers in petrification and non-green space. To do this, among other things, the municipality budgeted a total of 74 million euros.

In Arnhem unlocking is mainly addressed in relation to political history. The municipality has always been a relatively green city, and still is. Their political and civil society actors support green initiatives. They preserve their green space and help to create conditions for change. To invest in green space and climate adaptation the municipality have a total of 1.55 million euros available from within the organisation.

In 's-Hertogenbosch unlocking is mainly addressed in relation to their unique rule of thumb "*smart response to the flurries of climate change*". It is clear that the municipality research drivers of non-green space practices. This helps to identify target areas for action in the municipality. To achieve more green space the municipality has a broad greening strategy with a lot of goals. Even though there are many climate goals, there is enough budget to do "*all sort of things*", however no exact amounts are mentioned.

In Oss unlocking is mainly addressed in relation to an inconstant approval of initiatives. Greenery initiatives have become less fruitful due to political diversion. Meaning that their political support network has decreased. At the same time, greenery has gotten a higher priority on the agenda, meaning that their political support network has increased. On top of that the municipality of Oss has clear petrification goals. Unfortunately, no petrification rates have come forth. Therefore, it is unclear if the municipality research drivers of non-green space practices. To do this, 1.5 million euros haven't been budgeted.

In Wijchen unlocking is mainly addressed in relation to close contacts with active political support. Their support network of key, political actors to create conditions of change strong. In addition, the municipality follows closely what Nijmegen does and has prioritized what neighbourhoods are first to be stimulated to become greener. This implies that Wijchen does research on drivers of non-green space practices and can identify target areas for action. However, this is not completely clear from the data. Unfortunately, no *Budget in euros* data can be identified.

In Genep unlocking is mainly addressed in relation to a lack of petrification goals and budgets. This means that there is no evidence to suggest the municipality does research on drivers of non-green space practices. As a result, it would be hard for the municipality to identify target areas for action. But it is possible that Genep uses different topics of interest, no petrification rates, because of their unique geographical location. Unfortunately, no direct *Petrification rate and goals* or *Budget in euros* can be identified.

6.4 Transformative capacity

Transformative capacity influences what type of new innovations that are generated and how they are integrated into structures, cultures, and practices. The capacity consists of the following indicators: strategic goals and upscale and replication. These indicators will be mentioned respectively in the following chapter.

6.4.1 Transformative capacity in Nijmegen

6.4.1.1 Strategic goals

At the municipality of Nijmegen, the different governance levels come together to share knowledge and develop innovations by means of integral working. Rarely people get stuck in their own bubble. Resulting in relatively more out of the box ideas and knowledge.

In addition, there are regular meetings between the different chains. The water chain and green chain are working closely together. Building on their trust, they can create safe spaces to spar about their ideas and problems. Less often there are meetings between other chains, for example housing and mobility.

Operatie Steenbreek is an example of a project that provides inspiration for a climate resilient city. The project is active in the whole nation and can work mostly self-sufficient. Its successes lead to a cooperation between Operatie Steenbreek, the municipality and the neighbourhoods. The municipality acts as a catalysator to enable Operatie Steenbreek to work in their neighbourhoods, set up communication with the neighbourhoods and help with the implementation of removing pavement and planting greenery.

6.4.1.2 Upscale and replication

During Nijmegen Green Capital of 2018 Operatie Steenbreek had started in Nijmegen. It was able to upscale this event and it is still active in Nijmegen to this day. This process was picked up quickly by the parties involved. According to the municipality of Nijmegen they are flexible for a city of their size and compared to a more rural municipality. This is because of their mandated budgets. As the policy advisors can have their own budgets that they manage. This is also the case for the exploitation. Their department head is only involved with internal affairs and manages the budget on ambitions. This head of department has, for example, €350.000 for a project with a number. *“But it doesn't say anywhere, nor does anyone then ask how I'm going to fill that in. I can decide that myself. Only at some point I have to put it in the budget”*. So, there is investment cost reimbursement of the district somewhere there. And the council would like to know in the budget what project the money will be spent on. That's it. This enables the municipality of Nijmegen to experiment innovative strategies, solutions or networks in the form of pilots.

And above the budget of climate, there is an overall budget of about 1.5 million. About 3/4 of that disappears roughly to all sorts of things in the budget. The part that remains, the policy advisors can fill in themselves because it was put under the denominator *“large-scale greenery”*. Now a program will be made with the alderman so that there are better agreements on where the money can be spent. The current alderman has a 10-point plan and wants to be able to check off the points at the end of the year. However difficult this may be. So, each alderman fills in differently resulting in different upscale and replication practices.

The municipality of Nijmegen has mandated a lot, budget holders are low down in the organization. There are also budgets linked to implementation programs. This lacks flexibility. For example, in their regional cooperation with Wijchen. Nijmegen asks if they have another €2,000, but then Wijchen says no that is not possible. We don't have that money available for that. While they do have a sewerage plan of €5 to €6 million, of course you do have €2,000 left over somewhere. But Wijchen cannot spend that on anything else because it is linked to an implementation program. In Nijmegen more is possible because the responsibilities are lower in the organisation, compared to Wijchen. This enables Nijmegen to participate in regional and national projects concerning climate adaptation, since they can choose relatively flexible what to spend money on.

6.4.1.3 Shortcomings

Even though the municipality of Nijmegen has the ability to upscale and replicate flexible. There are concerns with their management style. The policy advisors have a lot of responsibilities. They can single handedly have a large impact. On the contrary this can result in significant costs or problems. It might be better not to mandate too much, just like in smaller municipalities. Where the city council is more responsible and can take 'better' decisions.

Also, the mandated policy advisors rely heavily on their expertise and judgement. Which comes with little transparency that could feed tensions between the civil service and the city council.

6.4.2 Transformative capacity in Arnhem

6.4.2.1 Strategic goals

In Arnhem the goal to be more climate active and climate resistant is central in policy plans. As mentioned before, there is a relatively new rule that each dwelling should have a green space within the area of 300 meters. On top of that, there are certain percentages of green coverage that must be met per neighbourhood. There are ambitions to expand forestry areas where possible. Arnhem tries to integrate their different managements, forestry management, nature management, city management. The soil health is an example for this, here multiple management directions have to cooperate in order to have a successful result for biodiversity, greenery and agriculture.

This last project, soil regeneration, is an example of different municipal levels that can work together and share knowledge and develop innovations in biodiversity, greenery and agriculture as described by Hölscher, Frantzeskaki and Loorbach (2018) as transforming capacity.

6.4.2.2 Upscale and replication

The soil regeneration project is also an example of an innovative solution. At the moment of the interview, there was no knowledge of what the soil quality was in Arnhem's forests, parks and fields. To put a quality label on their soil, the municipality has to measure physical, chemical as well as biological conditions. And mainly the last one is uncharted. Not just in Arnhem, but across the nation there is a lack of knowledge surrounding the biological soil quality.

To solve this knowledge-gap the municipality of Arnhem tries to collect relevant information and make soil goals. The ambition is to be able to manage soil maintenance in the municipality. Such ambitions are not without a reason. In the Netherlands there is a nitrogen crisis which is related to the soil quality. For the municipality of Arnhem, it would be beneficial to know how much nitrogen there is in their soil and how much can be stored in their soil. And the project gives new information that previously was unknown and uncharted.

6.4.3 Transformative capacity in 's-Hertogenbosch

6.4.3.1 Strategic goals

The 's-Hertogenbosch climate goal is the following: *"The city of the future is a green city. What we want to achieve is that the city and villages themselves are able to cope with flooding and heat. We want species-rich urban nature, close to our residents and we want to strengthen the relationship of the urban area with the countryside"*. To realise this strategic goal first definitions, need to be settled.

One cooperation that shares information and provides a platform for discussion is the 'Aanpak hoogwater' project. The water boards, municipalities, province and Rijkswaterstaat are jointly examining the task and possible solution directions in the coming years. For 's-Hertogenbosch to be adequately protected against extreme weather events, additional measures are needed. This requires difficult choices, because many measures require space, and space is scarce. That calls for smart combining and good cooperation for a water safe municipality region. Illustrating, different governance levels come together to share knowledge and to develop innovation. Just as described by Hölscher, Frantziskaki and Loorbach (2018).

The *'Aanpak hoogwater'* offers a long-term strategic goal: prevent flooding. However, there is criticism. A governance approach is used. Meaning, all parties should show responsibility for the problems regarding water. But, at the moment it seems like the parties downstream are putting in effort and the parties upstream are not. This can be explained by the different managements. The Dommel water board is originally nature focussed where the Aa and Maas water board is originally agricultural focussed. Meaning, the Dommel water board is in favour of water retention and natural wetlands and the Aa and Maas is committed more to water drainage in favour of agriculture practices. Not everybody upstream feels the urgency to act to a changing climate and its changing water levels, leaving parties frustrated. This does not add to a long-term strategic goal, but to long term hold ups in the project.

6.4.3.2 Upscale and replication

The municipality of 's-Hertogenbosch leaves a lot of climate adaptation measures up to the developers of spaces. They can decide themselves what to invest at a specific location, because every location can require different needs. The municipality only obliges the lawful rules in for example the building code. But, if a developer invests in more than what is lawfully obligated, the municipality can compensate other terms or requirements. As a result, innovative developments can arise in the municipality. Out of the box ideas are not by default illegal, but these provide an option to negotiate about building plans. This way the municipality helps to innovate climate adaptation by giving developers freedom.

Another way the municipality helps to innovate climate adaptation is that on each (municipal) project a climate specialist is involved to advise. This specialist can also communicate back with the rest of the climate team if new innovative practices have been found or any other information. This way, information is shared between the 's-Hertogenbosch climate specialists. Which can result in the most up to date policies.

6.4.4 Transformative capacity in Oss

6.4.4.1 Strategic goals

On the 26 of January 2023 the aldermen Dolf Warris presented a forest plan called *"Bos van Oss"*. An initiative run by the business community. The foundation 'Forest of Oss' was established to initiate and coordinate cooperation between employers, municipal government, education, interest groups and residents with the aim of achieving the planting of 20ha of forest. This forest contributes to several sustainable goals from the Global Goals. The Forest of Oss embraces Goal 17 by taking cooperation as its basis. This is not an easy path, but it is the most sustainable and future-proof one. The aim is for everyone to be involved in the living environment of Oss to embrace the forest.

This green initiative received a warm welcome, but not from everybody. Some aldermen felt sidelined. A group making and planning a forest without the consultation of the municipality which spends time and effort into programming their finances. And now, an initiative comes along to ask for money. Where should that money come from, what budgets should be used for this "unplanned" idea? This can ask a lot of flexibility the municipal organisation. In the end, the policy advisors of the municipality are confident the project will be realised, and it provides inspiration for a climate resilient city in 2050.

6.4.4.2 Upscale and replication

Oss had replicated trash collection bin ideas from other municipalities. Some municipalities allow a special ring around trash bins to collect deposit bottles and cans. This way, those items are separated from other trash and can be collected by for example homeless people, who often go through trash bins to collect deposits. For these people it is more safe and healthier to collect the deposit bottles and cans in a separate ring.

The city council had accepted this idea quickly and a pilot was set up in the city centre of Oss. Here, 20 trash bins have been fitted with an extra ring for half a year, to gain experience with the innovative idea and investigate the costs and benefits.

According to an Oss municipality employee in Oss this is possible because they work pragmatic and practical. If an innovative implementation is obsolete, they have the capacity to remove it. Every 6 months such ideas are reviewed. In Oss, these deposit rings have been removed after a month already. Since, a large number of wasps had gathered to enjoy the sugary remnants. Which caused inconvenience to the visitors of the centre of Oss.

However, with green space investments it is odd to just get rid of the space if it turns out not to be successful. Trees are expected to be at a location for a minimum of 30 years. Preferably longer. Therefore, placing trees goes with a lot of thought and planning. With smaller green spaces it is easier to transform. In 2012 the municipality of Oss had a cut back of 200.000 euros. Green space management chose to transform ornamental flowers to grass, since grass requires less maintenance and thus less costs. Showing their adaptability.

6.4.5 Transformative capacity in Wijchen

6.4.5.1 Strategic goals

Just as Nijmegen, the municipality of Wijchen is part of the manifest '*Regionale Adaptatie Strategie Rijk van Maas en Waal*', in short 'RAS'. Signed on 12th of June 2019. In this manifest the parties involved agreed to take responsibility for a climate resilient and water robust region by 2050. In total the municipality of Wijchen has four main missions:

1. The Rijk van Nijmegen and Land van Maas & Waal region is committed to, preferably by 2035, but no later than 2050, to be a climate-proof region.
2. In this region people can live, work and recreate safely and pleasantly.
3. Water nuisance caused by extreme rainfall is kept to a minimum and prolonged drought does not cause significant problems for nature, agriculture and traffic.
4. Heat stress among vulnerable groups is a thing of the past and vital, vulnerable functions can withstand extreme weather.

6.4.5.2 Upscale and replication

The Wijchen and Druten local government organisation have a unique situation in which policy advisors advise both the Wijchen and Druten city council. As a result, the employees can use successful practices double.

The 'RAS' document presents 10 strategy lines, which are derived from the Delta program Spatial Adaptation (DPRA). One of these is as follows: "*We dare to experiment and innovate and will get started with the high-hanging fruit tomorrow*". To do this, climate adaptation will be integrated into other challenges. For example, the energy transition, forest vision, road reconstruction and housing crisis.

On top of that, there are other means that help to experiment and innovate. For example, Druten already has a recent nature policy. From 2020. Wijchen, can use this nature policy as inspiration for their new nature related policies. The same policy advisors make the new Wijchen policy document, they have the experience of making the Druten nature policy. This way, the organisation can cherry pick successful practices that had worked and improve practices that can be done better since 2020. The double service enables the municipality of Wijchen to become increasingly more efficient and innovative. In the end, the municipality of Wijchen can replicate practices and policies from the municipality of Druten, and vice versa. Also, upscaling practices and policies can be done more easily.

6.4.6 Transformative capacity in Genneep

6.4.6.1 Strategic goals

The main strategic goals of Genneep are to integrate different disciplines work fields. The integration is crucial for green space investments because different disciplines in policies can contradict each other. Think about the low groundwater level because of agricultural purposes and the greenery goal. Both

goals cannot exist at the same time at the same place. But this does not mean that municipalities cannot try to work with it. *“You can do pilots with this, just try!”*

Other problems are clearer. For example, if in the planning process, making homes climate-adaptive costs relatively little while transforming existing homes is very expensive. Then it makes sense to steer that planning. But this can be a challenge if work fields are separated. One should concentrate more on the interfaces of policy fields. In small municipalities, everyone automatically does everything integrally, because you are a generalist and not a specialist. In a large municipality, this does not have to be the case. There you have all these different compartments. It is precisely at the interfaces of policy fields that you need to sit down and not on the substantive issues.

Specifically, management (beheer) of greenery can be disagreeable. Green can be multifunctional and even in odd places. It can canopy a street and provide shade. But these relatively new places are requiring more effort, thus more money, to maintain. This is exactly the reason why the greenery management of Gennepe can be disagreeable to practical alternatives, even though such alternatives help to reach climate goals.

6.4.6.2 Upscale and replication

One could say that a small municipality of Gennepe will not invent the wheel and wait for larger municipalities to come up with innovative ideas. Since, they have more manpower and money. But the municipality of Gennepe does not fit in this narrative. This municipality prides its rethinking ability. This municipality cooperates with *‘Operatie Steenbreek’*, but the employees are also able to replicate other innovative initiatives. The acorn burner and bio miller projects for example.

Both initiatives are innovative and progressive. Yet, both are controversial in Gennepe because of their low return. But the employees of municipality Gennepe state that return is not the most important. It is all about inspiring each other and gaining experience. And given the fact that Gennepe is in an odd geographical spot they cannot replicate much from other municipalities, new ideas and out of the box thinking helps Gennepe to provide inspiration for a climate resilient area.

6.4.7 Transforming capacity in short

In Nijmegen transformative is mainly addressed in relation to integral working. Rarely people get stuck in their own bubble. Resulting in relatively more out of the box ideas and knowledge and collaboration between different local government levels. Inspiration for a climate resilient city can be provided by the projects of Operatie Steenbreek. It also illustrates the municipality's ability to upscale and replicate because their policy advisors have a lot of responsibility. And this enables the municipality of Nijmegen to experiment innovative strategies, solutions or networks in the form of pilots.

In Arnhem transformative is mainly addressed in relation to innovative solutions. Their soil regeneration project is an example of a project that provides inspiration for a climate resilient city. It helps to generate innovative solutions, share knowledge and cooperation between different local governmental levels.

In ‘s-Hertogenbosch transformative is mainly addressed in relation to regional cooperation and internal cooperation. To achieve their regional cooperation, *‘Aanpak hoogwater’*, the municipality first focusses on cooperation between different local government levels to share knowledge and to develop innovation. In addition, the municipality of ‘s-Hertogenbosch has an innovative way to upscale and replicate desired developments by giving responsibility to private parties. Which helps to stimulate out of the box ideas.

In Oss transformative is mainly addressed in relation to the Forrest of Oss. The foundation ‘Forest of Oss’ was established to initiate and coordinate cooperation between employers, municipal government, education, interest groups and residents. On top of that the municipality can upscale and replicate every 6 months by reviewing their pilots making the organisation adaptive to innovation.

In Wijchen transformative is mainly addressed in relation a dual organisation. The Wijchen civil service also works for the municipality of Druten and vice versa. As a result, both camps can learn from each other's experiments and innovations and policy advisors gain extra experience to make practices go faster.

In Gennep transformative is mainly addressed in relation to innovative ideas. Two examples of such ideas that inspire and give experience are the acorn burner and the bio miller projects. It is important for Gennep to do this themselves since their unique geographical spot does not allow them to replicate much from other municipalities, new ideas and out of the box thinking helps Gennep to provide inspiration for a climate resilient area.

6.5 Orchestrating capacity

The orchestrating capacity enables coordinated climate government measures in line with overarching visions for sustainability and resilience. Here a long-term vision is important, which can be found in local government documents. The capacity consists of the following indicators: policy documents and formal and informal networks and communication channels. These indicators will be mentioned respectively in the following chapter.

6.5.1 Orchestrating capacity in Nijmegen

6.5.1.1 Policy documents

The municipality of Nijmegen has the following policy documents that are relevant: 'Actieplan Hartje Nijmegen'; 'Bomenplan Nijmegen 2021'; 'Klimaatadaptatie strategie Nijmegen'; 'Nijmegen stad in beweging – omgevingsvisie'; 'Weerbaarheidsanalyse 2022'; 'Binnenstadslab'.

Orchestrating capacity is visible in the long-term direction for climate adaptation and resilience, which resonates in official policy documents, changing narratives and the way solutions are designed and implemented. The municipality of Nijmegen has shown that they work together with the city. Referring to the inhabitants, visitors and entrepreneurs. Collaborative processes including citizen surveys and cross departmental and public-private debate to stimulate innovation and visions.

6.5.1.2 Formal and informal networks and communication channels

At the municipality of Nijmegen responsibilities are low within the organisation. This has impact on the networks to mediate priorities, knowledge and resources across sectors. For example, as a result of new policy, municipalities need to make an '*omgevingsvisie*' instead of a '*structuurvisie*'. Management of greenery can be mowing, pruning, watering and other upkeep. Meaning, a new document about the greenery management is welcome. At the municipality of Nijmegen this is integrated in the document '*Biodiversiteitsplan*'. The policy advisors at Nijmegen used this new document as an opportunity to also integrate green policy in the new document. Even though, this can be described in the vision document. After doing this, it has direct consequences for the greenery management team and other stakeholders. Because the new policy is just as valid as any other. At the end, this informal way of communicating any new policy ensures solutions design and implementation.

On top of that, the greenery management team is able to execute new rules and policy quickly due to their close connections and flat hierarchical system. To achieve this both formal and informal networks and communication channels are used.

Next to communicating within the local government system, there is also communication to other parties. Inhabitants for example, need to be informed about a change in mowing policy. Otherwise, they might get irritated and complain. And this extern communication requires a lot of intern communication to prepare. Meaning, extern communication will result in intern communication, if done correctly. Weather this is formal or informal is of less importance, the message matters.

6.5.2 Orchestrating capacity in Arnhem

6.5.2.1 Policy documents

The municipality of Arnhem has the following documents relevant for green space investments to address climate adaptation: Ontwerp Omgevingsvisie Arnhem 2040; Strategie Klimaatadaptatie 2020 - 2040; Bomenplan; Groen visie 2017-2035. These are also shown in the methodology chapter 4.3.2. Meaning, the municipality poses multiple tools to find solutions and implementations. And the policy documents help the municipality to reach their long-term direction. Since that is the function of such policy documents.

6.5.2.2 Formal and informal networks and communication channels

The policy advisors have a lot of responsibilities, this requires communication with the council. Since they set out the general goals and ambitions to follow. In Arnhem it is important to be working on the bigger goal rather than small wins. *“If you envision yourself working towards a bigger goal, you will get there together. Despite personal differences and clashes”*. The Arnhem council keeps close relations with the policy advisors to work on their bigger goal.

Within the organisation of the municipality Arnhem informal networks are used regular. The municipality attends the Groen Forum, which is a meeting between clubs, foundations and associations that invest time and effort in green initiatives. The goal of this regular meeting is to just see what is happening and whom might be able to help each other. Additionally, the municipality can use this network to poll new policy plans. Which work well, *“Well, you know that way works very well. It’s been that way for a long time”*, according to an employee. This increases the understanding of narratives, solutions design and implementation.

6.5.3 Orchestrating capacity in ‘s-Hertogenbosch

6.5.3.1 Policy documents

‘s-Hertogenbosch has multiple relevant policy documents: *‘Beleidsplan ‘s-Hertogenbosch Groen en Klimaatbestendig 2021’*; *‘Koersdocument Omgevingsvisie’*; *‘Bomenbeleidsplan september 2017’*.

The Den Bosch ‘Bomenbeleidsplan’ is elaborated. However, the Omgevingsvisie is a concept document, it is not finished. Therefore, some topics are not discussed or lacking in their discussion. Furthermore, the *‘Beleidsplan ‘s-Hertogenbosch Groen en Klimaatbestendig’* is shallow on details compared to Nijmegen and Arnhem.

6.5.3.2 Formal and informal networks and communication channels

One would expect that the larger the organisation is the more bureaucracy is present and in turn more formal relations and networks occur. However, the municipality of ‘s-Hertogenbosch proves this wrong. Here, there is a healthy combination between formal and informal networks. The communication channels between policy advisors and aldermen are normal. This can be attributed to the Brabant culture to some degree and the team leaders present at the moment, according to a policy advisor that works in secondment. Meaning, this person can compare the organisation to other organisations.

One-way, priorities, knowledge and resources can be prioritised across sectors is by involvement. Each municipal project has a climate specialist who can carry information back and forth between parties involved. These specialists are also in contact with each other, leading to a well informed and connected network.

6.5.4 Orchestrating capacity in Oss

6.5.4.1 Policy documents

Oss has multiple relevant policy documents: *‘Koersnota klimaatadaptatie 2050’*; *‘Gebiedsvisie stadjes en kernen’*; *‘gebiedsvisie Vitaal Buitengebied’*; *‘Visie stedelijk gebied Oss-Berghem’*; *‘Groen Blauw en Natuur – Routekaart’*; *‘Een Osse klimaatadaptatie/groennorm’*.

In Oss their vision document is split into three documents specifically designed for each area. Towns and cores, vital outdoor area and urban area Oss-Berghem. This separation is made because the municipality of Oss is large and diverse in needs. It would be hard to make one vision for the entire area, when there are clear differences in areas. Now the three visions allow customisation to each area, and it enables coordinated climate government measures to be in line with overarching visions for sustainability and resilience. No other municipality has designed their visions in the same way.

6.5.4.2 Formal and informal networks and communication channels

Before Oss was such a large municipality, in area size and inhabitant size, the lines of communication were shorter and more informal. Then, the aldermen would walk past the policy advisor's desks and start conversations. But, as the organisation grew, its bureaucracy grew, and the lines of communication got increasingly formal.

At the moment policy advisors have formal lines of communication to contact aldermen. These formal lines are part of the organisation structure to ensure the right people with the right responsibility are involved. Also planning meetings with the aldermen is done formal, since everybody has a strict agenda. For the policy advisors, however, it is not impossible to contact the aldermen via different routes. These more semi formal, as the employees put it, networks are used too. For example, emailing the aldermen personally.

In addition, the policy advisors have their own budgets which they can spend on research or small projects. Meaning, the responsibility is low in the municipality of Oss organisation. This can help to set their overarching vision for sustainability and resilience in the municipal policies. Because they have the freedom to explore specialized topics.

6.5.5 Orchestrating capacity in Wijchen

6.5.5.1 Policy documents

The municipality of Wijchen has multiple policy documents. However, the most relevant document, regarding climate adaptation policy, is not finished. It is still work in progress. As a result, this research has to contain alternative documents that are available. These are: 'RAS'; 'strategisch kompas Wijchen 2035'; 'Wijkenstrategie 2023' and provide information on which a climate adaptation policy can be based.

6.5.5.2 Formal and informal networks and communication channels

Only communication employees are educated in communication. However, this is important for every employee. Also, for the policy advisors and aldermen. Wijchen aims to get their message across the municipality. And the municipality wants to inspire and educate the inhabitants about the benefits of greenery and other climate adaptive measures.

On top of that, the organisation has formal lines of communication between the policy advisors and the aldermen. This is due to the busy agenda and deadlines. Often, one policy advisor only has to deal with one or two aldermen. Therefore, the communication might go more informal regarding "little" things.

During the municipality of Wijchen data collection not all data was saved. Half of the conducted interview is not saved properly on the computer. As a result, the researcher can recollect some information from his experience and listening skills. However no hard claims can be stated since there is no primary evidence for such claims other than memory, which is subject to error.

6.5.6 Orchestrating capacity in Gennepe

6.5.6.1 Policy documents

The municipality of Gennepe have three relevant policy documents: Omgevingsvisie Gennepe; Groener Gennepe, Groenbeleidsplan 2021-2031; Duurzaamheidsvisie 2018-2021.

The last one, Duurzaamheidsvisie 2018-2021 has expired. Meaning, at the moment there is no active sustainability vision to define any policy from. This causes the following problem. If a developer has a new plan and asks the municipality what climate-proofing requirements are in place, the municipality has no answer. This is because there is no policy to ensure this. The municipality can then try to pass on wishes in negotiations. However, this is uncertain because a property developer does not have to adhere to them. This is a case of good faith or good hope. The municipality can also try to bluff, but of course the municipality does not want to depend on that.

At the moment policy advisors at municipality of Gennepe are working on their sustainable vision and relevant policy to resolve the issue. In the meantime, the municipality has used a so called "*inspanningsverplichting duurzaamheid*", freely translated this means commitment to sustainability. But there are no legal grounds in this temporary solution.

6.5.6.2 Formal and informal networks and communication channels

Gennepe is in the top of the province Limburg, close to the provinces Noord Brabant and Gelderland, in addition they are close to the German border. As a result, the municipality has a vast network in their area. Since the municipality of Gennepe is relatively small, they use vision documents of the municipality Land van Cuijk in Noord Brabant. But this can be troublesome since their small neighbouring municipalities use vision documents of other larger municipalities. Meaning, Gennepe has to communicate and work together with visions and policies that all find their origin in different places, Limburg, Noord Brabant, Gelderland and Germany.

Within the organisation the communication channels are short. The policy advisor can easily walk by the council member and ask them about something. Little topic can be discussed with each other without putting it on the agenda resulting in a fast and integrated working environment. This is easier compared to a bigger municipality where a meeting with a council member needs to be planned formally. The bigger the more bureaucracy. And the bigger the more knowledge. Gennepe tries to increase their knowledge without increasing bureaucracy.

One downside of the informal networks at the municipality of Gennepe is that the council members can be influenced by someone with a personal agenda. Their problem can occupy much time and effort that could be invested in the public good.

6.5.7 Orchestrating capacity in short

All municipalities have policy documents, which are also analysed in this research. However, the municipalities of Wijchen and Gennepe have no finished climate adaptation document at the moment. Meaning, there is no clear long-term direction climate adaptation direction to be identified. And even though 's-Hertogenbosch has an expired spatial vision, they can still use it as such. The municipalities of Nijmegen, Arnhem and Oss have a clear long-term direction.

In Nijmegen orchestrating is mainly addressed in relation to creative way of communicating new policy. In Nijmegen the policy advisors used their biodiversity plan to settle greenery management too. It is a good innovative way to mediate priorities, knowledge and resources across the sector.

In Arnhem orchestrating is mainly addressed in relation to working towards a bigger goal rather than small wins. To do this the council members and policy advisors keep each other close in their network and policy advisors can use the Green Forum to gauge what's going on with the public. This increases the understanding of narratives, solutions design and implementation.

In 's-Hertogenbosch orchestrating is mainly addressed in relation to a healthy combination between formal and informal networks. For a large organisation 's-Hertogenbosch is not as bureaucratic as one might expect. Meaning that climate specialists can prioritise priorities, knowledge and resources across sectors.

In Oss orchestrating is mainly addressed in relation to a three specially designed visions. These three visions allow customisation to each area, and it enables coordinated climate government measures to be in line with overarching visions for sustainability and resilience.

In Wijchen orchestrating is mainly addressed in relation to the absence of climate adaptation policy. As stated before, Wijchen lack the presence of a climate adaptive policy plan, the municipality is still working on it. At the moment, this means that it is hard for the municipality to coordinate climate policy in line with their visions for sustainability and resilience. When their climate adaptation policy is finished, they will be able to coordinate climate policy in line with their visions.

In Genneep orchestrating is mainly addressed in relation to an absence of a sustainability vision. The same problem arises as did for Wijchen. At the moment, this means that it is hard for the municipality to coordinate climate policy in line with their visions for sustainability and resilience. To solve this there is a temporarily solution in place but it has no legal grounds. However, this will change when a new sustainability vision is finalised.

6.6 Conceptual analysis

This chapter will discuss the meaning, importance and relevance of the results. To do this, the chapter will focus on explaining and evaluating on the findings, showing how it relates to the literature. It will make the first of two arguments to support the next chapter, the conclusion. The six municipalities are further compared on the basis of codes. This way of quantifying the data is called the conceptual analysis (QUT Design Lab & Swann, 2020) and is used to get a better understanding of the collected data, as mentioned in *Methodological choices chapter 4.3*.

Table 11 below shows the Code-Document Analysis. In the x axis the six municipalities are presented and in the y axis the four governance capacities, independent variables, and the '*green space policy*', dependent variable, are presented. The x axis also shows how many documents have been coded per municipality. This amount is partly responsible for the differences in codes per municipality. Municipalities with a large number of documents, generally, have more text to code and thus have more codes in total. However, there are three exceptions.

Firstly, the municipality of Genneep only has 2 documents analysed and is overrepresented with codes. Especially regarding the stewarding capacity. This goes to show that the municipality of Genneep is more focussed on their stewarding capacity, compared than the other municipalities.

Secondly, the municipality of 's-Hertogenbosch has a relatively low number of codes for their stewarding capacity regarding their number of documents. This gives reason to think that the municipality is less concerned with their stewarding capacity, compared to the other municipalities.

Thirdly, the municipality of Nijmegen has no codes at all for their unlocking capacity. Suggesting that the municipality is not concerned with their unlocking capacity, which consists of '*Petrification rates and goals*', '*Support from the council*' and '*Budget in euros*'. But the municipality has clear indicators for the unlocking capacity as presented in chapter 5.2.1 *Unlocking capacity in Nijmegen*. The petrification rates and goals are in the 'Klimaatadaptatie strategie Nijmegen, 2022' document. On top of that, the support from the council indicator is uniformly absent in the policy documents, because the interviews have collected the majority of this data, rather than the documents. Therefore, no codes are expected. One explanation could be that the budget indicator is not mentioned in the Nijmegen documents and is in other municipalities' documents. To find a budget indicator, an extra document (stadsbegroting) is used and not included in the analysis later.

	Nijmegen (6)	Arnhem (5)	's- Hertogenbosch (3)	Oss (5)	Wijchen (3)	Gennep (2)	Total
Green space policy (green)	310	904	421	520	151	234	2.540
Stewarding capacity	104	90	15	124	59	102	494
Unlocking capacity	0	14	6	17	1	5	43
Transforming capacity	64	24	12	23	21	1	145
Orchestrating capacity	3	16	4	9	2	10	44
Total	481	1.048	458	693	234	352	3.266

(Table 11)

Furthermore, the table shows that urban municipalities have more codes in total for their transforming and orchestrating capacity. The rural municipalities have more codes in total for their stewarding and unlocking capacity. This indicates that there is a division between the use of governance capacities of urban and rural municipalities.

The total number of codes can be seen in the white rows of the table above. It is notable that Arnhem has the most codes in total for governance capacities and green. Second is Oss, followed by Nijmegen and 's-Hertogenbosch. Gennep and Wijchen both have remarkably fewer codes in total. This means that the urban municipalities tend to have more total codes compared to rural municipalities. However, Oss is an exception to the rule. This can be explained by the number of documents produced by the municipality of Oss, five. This is higher compared to the other rural municipalities.

6.7 Relational analysis

This chapter will discuss the meaning, importance and relevance of the results. To do this, the chapter will focus on explaining and evaluating on the findings, showing how it relates to the literature. It will make the second of two arguments to support the next chapter, the conclusion. The six municipalities are further compared on the basis of the previous chapters about the governance capacities, 5.2, 5.3, 5.4 and 5.5. To do this, a relational analysis is used as mentioned in *Methodological choices chapter 4.3*. (QUT Design Lab & Swann, 2020). Since the six municipalities are made up of more rural and more urban municipalities a clear division is made in the table below.

Urban Municipalities	Rural municipalities
M1: Nijmegen	M4: Oss
M2: Arnhem	M5: Wijchen
M3: 's-Hertogenbosch	M6: Gennep

(Table 12)

Main concepts
C1: Stewarding capacity
C2: Unlocking capacity
C3: Transforming capacity
C4: Orchestrating capacity

(Table 13)

To compare the municipalities the main concepts in the previous chapter are scored. The maximum score of 4 is given when there is evidence that a municipality have all indicators as described by Hölscher, Frantzeskaki and Loorbach (2018). Respectively, when a concept is not complete a score less than 4 is given. This way, the qualitative data is quantified and can be compared clearer. However, it does not mean that one municipality is “better” or “worse” compared to another.

	Urban	Urban	Urban	Rural	Rural	Rural	Total Urban	Total Rural
	M1	M2	M3	M4	M5	M6		
C1	2	3	3	3	2	3	8	8
C2	4	3	3	3	2	2	10	7
C3	4	4	4	4	4	4	12	12
C4	4	4	2	4	2	2	10	8
Total	14	14	12	14	10	11	40	35

(Table 14)

In table 14 above the final scores are presented based on chapters 5.2, 5.3, 5.4 and 5.5. A difference in totals between urban and rural municipalities can be seen, originating from the unlocking capacity and the orchestrating capacity.

The first difference, in the unlocking capacity can be explained by the petrification rate and goals and the budget in euros. The petrification rate was not presented in the Arnhem, ‘s-Hertogenbosch, Oss, Wijchen and Gennep documents, only in the Nijmegen documents. Therefore, only Nijmegen scored four at the unlocking capacity. The other municipalities have goals that are related to petrification but do not target petrification directly. Due to the unique geographical location of Gennep there is less of a need to know the petrified areas, or petrification is less prevalent. On top of that, no budget could be found to give an indication on what the municipality of Wijchen and Gennep can allocate to green space or other climate adaptation.

The second difference, in the orchestrating capacity can be explained by the policy documents. From the urban municipalities, ‘s-Hertogenbosch scores lowest. This municipality has no finished spatial vision document, their ‘omgevingsvisie’ is a concept. As a result, some information is missing, and certain aspects can remain unclear. The same goes for the rural municipalities Wijchen and Gennep. Both have a policy gap. Wijchen is still working on their climate adaptation policy. Meaning, some vital information is missing. This can be seen in table 11, where the Wijchen documents have only three codes for unlocking and orchestrating capacity. For example, their petrification goals as demonstrated in chapter 5.2.5 Unlocking capacity in Wijchen. In addition, Gennep has no active sustainability vision and policy that is legally grounded. Therefore, both municipalities score lower compared to the other rural municipality Oss.

6.8 Discussion

As was made clear by the capacity of 's-Hertogenbosch municipalities are interested in green space, not for the sake of green space, but for the sake of human health and wellbeing (Buiten Ruimte, 2023). Green space in itself is not an ambition, rather a means.

During the data collection of 's-Hertogenbosch it became clear that one employee assigned the *fine* working environment and informal networks as a regional trait that is inherent in local culture. This is only in 's-Hertogenbosch and Brabant present, not anywhere else. On top of that, the data collection of Wijchen made it clear that there is a spatial distinction in conservatism (Druten) and progressivism (Wijchen and Nijmegen). Both findings are confirmed by Huijsmans et al. (2021) who found an increasing difference between rural and urban cultural attitudes, from 1979 till 2016 in the Netherlands. The divergence is mostly due to the fact that the attitudes of people in the large cities differ from those in other parts of the country. Trends in rural areas are similar to another. The strongest divergence is in very strong urban municipalities, suggesting that inhabitants of the inner cities of large metropolitan areas hold unique progressive cultural values. Multiple other authors that have suggested that there is a growing divergence between the political attitudes of urban and rural peoples in the United States (Bishop & Cushing, 2008; Johnston, Manley, & Jones, 2016; Rodden, 2019) and in Europe (Jennings & Stoker, 2016; Maxwell, 2019). Rural inhabitants are politically more conservative and nationalistic compared to urban inhabitants (Cramer, 2016). It gives clues that urban inhabitants became increasingly progressive while at the same time rural inhabitants did not. Or it could be the other way round, rural inhabitants became increasingly conservative while at the same time urban inhabitants did not.

7 Conclusions

7.1 Answers to the research questions

As stated in the introductory *chapter 1.3 Research questions* this research focusses to explore the relationship between governance capacity and green space policy by local governments. In addition, it focusses on what the effect of geography is on this relationship. The main research question is as follows:

What is the relationship between governance capacity and green space policy by local governments and to what extent do geographical characteristics influence this relationship?

So far, we have seen that green space policies differ between the municipalities of interest and that rural municipalities have less green space policy compared to urban municipalities. After that, it became clear what the governance capacities looked like for each municipality (*chapter 5.2, 5.3, 5.4, 5.5*). Within those governance capacities the urban municipalities score higher compared to the rural municipalities. Specifically in their unlocking and orchestrating capacity. The stewarding and transforming capacities are similar for urban and rural municipalities.

Now, based on a qualitative analysis of interviews of both local governments and independent experts, and policy documents, there is evidence to suggest an effect from geographical characteristics on the governance capacity and green space policy relationship.

More specific, municipalities with more urban characteristics tend to have more green space policy compared to municipalities with more rural characteristics. This is due to their unlocking and orchestrating capacity. So, the research results suggest that urban municipalities are more able to recognise and dismantle structural drivers of unsustainable path dependencies and maladaptation, compared to rural municipalities. Furthermore, urban municipalities are more able to coordinate multi-actor processes and foster synergies and minimise trade-offs and conflicts across scales, sectors and time, compared to rural municipalities.

This means that, climate governance is better developed in urban municipalities. Here, the conditions are more in favour to, for example, penalise unsustainable activities as petrification. Or to promote alternatives and raise awareness of green space benefits. Thus, addressing climate change and steering climate adaptive transformation can be done most efficiently in urban municipalities.

Furthermore, it is clear that more urban municipalities are earlier in producing new policy compared to more rural characteristics. Since, two of the three rural municipalities have crucial policy writing work in progress, where urban municipalities do not. It suggests that rural municipalities wait for urban municipalities to finish their policy documents, so they can adopt the best practices. Meaning, that the rural municipalities are purposely falling behind in climate governance.

Now, the sub research questions will be answered:

1. *To what extent do the local governments accommodate the provision of green space in their policies?*

Local governments have varied ways to accommodate the provision of green space in their policies. They all use stewarding, unlocking, transforming and orchestrating capacities. But there is a clear favour to accommodate the provision of green space via stewarding capacities, followed by transforming capacity, orchestrating capacity and unlocking capacity respectively.

2. *To what extent do local governments have governance capacities related to the provision of green space in their area?*

The local governments all possess governance capacities. However, there are differences which can be seen in *chapter 6.7 Relational analysis table 3*. The quality of the governance capacities overall is the

same for the stewarding capacity and the transforming capacity. The differences originate from the unlocking capacity and the orchestrating capacity.

3. *Are there differences between rural and urban local governments in their way of accommodating the provision of green space in their policies?*

Urban local governments have more provision of green space in their policies compared to rural local governments. This can be seen in *chapter 6.1 Green space policy table 1*. Here, first, the word count “groen” of urban local governments outweigh the rural local government. Second, the urban local governments all have a climate adaptive policy in place, whereas not all rural local governments have. Third, the urban local governments all have multiple green space instruments to use, and for the rural local governments only one has a green space instrument to use. Therefore, rural local governments accommodate the provision of their green space less thorough than their urban counterparts.

4. *Are there differences in governance capacity related to the provision of green space policy between rural and urban local governments?*

Chapter 6.6 *Conceptual analysis table 2* shows that urban local governments have more green space provision via their transforming and orchestrating capacity. The rural local governments have more green space provision via their stewarding and unlocking capacity. This indicates that there is a division between the use of governance capacities of urban and rural local governments. Urban local governments favour the use of transforming and orchestrating capacity and rural local governments favour the use of stewarding and unlocking capacity.

7.2 Theoretical reflections

As stated in chapter 1.2 *Research problem*, Van Popering-Verkerk et al. (2022) state that governance networks are constantly in motion, therefore this research offers an update on what was previously known about Dutch local governments and their climate governance. This research on itself is a single snapshot, but together with other governance literature, for example Hölscher, Frantzeskaki and Loorbach (2018), it serves a monitor over a longer period of time. Here we can see the state of governance capacities for six Dutch local governments in 2023 and in their research we can see the state of governance capacities for the local government of Rotterdam in 2015. Therefore, the research adds to governance comparisons and trends.

Second, the relationship between governance capacities and green space policy is not understood sufficiently (Ministerie van Financien, 2023). This research adds to the knowledge gap of measuring performance efficiency of local governments by providing more data collection for this relationship and to provide statements on why policy varies and changes. On top of that, it would be recommended to research local government governance capacities on a larger scale with more data. This research is limited to six municipalities and 15 interviews. It would be useful to know if a larger sample size results in the same conclusion or if it disproves the current findings.

Third, the usefulness of the governance capacities framework is demonstrated by this research. The ongoing changes towards climate governance are better understood by the help of the framework. Due to this research, it has become clear that the capacity gaps can be predicted with the use of geography. It offers an additional variable to the framework that, potentially, helps to make future predictions more precise. It is more clear what roles Dutch local governments play in effective climate governance processes. Therefore, this research has contributed to improve the governance capacities framework designed by Hölscher, Frantzeskaki and Loorbach (2018).

Fourth, the urban-rural dichotomy literature is relevant in climate change effects (Fujibe, 2009; Ren et al., 2007; Stone, 2007). This research provides evidence to back up cultural differences between urban and rural areas (Bishop & Cushing, 2008; Johnston, Manley, & Jones, 2016; Rodden, 2019; Jennings & Stoker, 2016; Maxwell, 2019). The fact that rural inhabitants are politically more

conservative and nationalistic compared to urban inhabitants, can be confirmed (Cramer, 2016). However, this research also has found evidence to disprove the political distinction, since rural municipalities use urban municipalities to inspire their own policy from. Meaning, the two are not so politically divergent in this case of urban and rural local governments, as suggested.

However, this research does not prove a positive or negative effect from either urban or rural areas. Huijsmans et al. (2021) suggests that strong urban municipalities diverge most, but this is not clear from this research. It could be because the urban local governments in this research are not 'urban' enough.

Last, this research is just a piece of the puzzle. Much is left to be done. The implementation of climate adaptive plans is still not sufficient. Now, we know that there is an efficiency difference between urban and rural areas in green space policy. However, we still do not know the economical differences and impacts, as presented in *chapter 6.3 Unlocking capacity*. In order to make a more complete framework it needs to be investigated how much the governance capacities cost. This will help decision makers in Dutch policy to prioritize climate adaptation in the "battle for space" in the Netherlands to speed up implementation and ensure sustainable and liveable environments.

7.3 Practical recommendations

As mentioned before, municipalities with more urban characteristics tend to have more green space policy compared to municipalities with more rural characteristics due to their unlocking and orchestrating capacity. This suggests that urban municipalities are more able to recognise and dismantle structural drivers of unsustainable path dependencies and maladaptation, compared to rural municipalities. On top of that, urban municipalities are more able to coordinate multi-actor processes and foster synergies and minimise trade-offs and conflicts across scales, sectors and time, compared to rural municipalities. Therefore, to maximise efficiency, urban municipalities should focus on unlocking and orchestrating capacities and help to speed up implementation.

In addition, it would be smart to keep policy effective. If a certain green space policy does not have the desired effect, alter the policy. This is not a sign of failure, because the climate goals are relatively new and uncharted in policy making, but a sign of trustworthiness. It is part of the spatial transformation of the country and helps to ensure a sustainable liveable environment for future generations.

7.4 Limitations of the study

The conclusion above and the results in this research need to be interpreted with caution and cannot be generalised widely. As Kaufman, Kraay & Mastruzzi (2010) put it: *"Due to the inherently unobservable nature of the true level of governance in a country, any observed empirical measure of governance will only be an imperfect proxy for the broader dimensions of governance that it reflects"*.

First, the data collection. Data is collected over the municipalities of Nijmegen, Arnhem, 's-Hertogenbosch, Oss, Wijchen and Genneep. Therefore, the data says little about all municipalities in the Netherlands. On top of that, the data is not equally collected. There is an unequal representation of respondents per municipality. Not all municipalities have the same number of respondents, therefore it is not completely fair to compare the collected data across municipalities. For some municipalities there is more information available than for others. It is likely that there are more green space instruments than mentioned in this research. The conclusions in this research are based on the evidence that comes forth in this research alone.

Second, the modern technology. As this research presented in the methodology an Artificial Intelligence (AI) tool of Atlas.ti is used to code the collected data. Even though it saves time, and it prevents human error it is not aware of the research topic. As a result, the AI also coded irrelevant parts. This extra data is obstructing a clear overview. On top of that, the AI makes mistakes. Some codes have been removed by hand, but not all. Therefore, an analysis based on AI codes rather than human codes is less reliable. In addition, the majority of the interviews had been conducted online via Teams. This has resulted in the opportunity to record most of the interviews. Only one was not

recorded properly, and potentially valuable information has been lost. So, relying too much on technology is not always desirable.

Third, the characterisation between urban and rural can be confused with size. As respondents pointed out there could be a relation between the size of a municipality and their degree urbanisation. Retrospectively, this should be more included in the research, since the research results suggests that rural municipalities wait for urban municipalities to finish their policy documents, so they can adopt the best practices. But it is not clear if urban-rural is of influence. It would make more sense to dedicate this to the size of the municipality. Future research should look into this. Specifically, if the exception of Oss is due to their size or not. Because it can be that Oss scores like an urban municipality not because it is an urban municipality but because of its population size.

Last, the research has been made to fit afterwards. The original research proposal had a different topic, green space investment instead of green space policy. However, this alternative data was hard to come by. Data on green space investments was scarce. Some data is available via an organisation, but this organisation was not keen in sharing all the data. Or during the interviews some respondents said they didn't know or where to get such information. Others, who could answer, where not sure or definitive. Efforts to retrieve such information via alternative ways have not been fruitful. As a result, the research has been altered to fit the collected data. Therefore, in future research it is necessary to be sure to have a dataset of some sort. This can guarantee research results.

8 Literature

Attwell Karen. (2000). *Urban land resources and urban planting - case studies form Denmark*. Elsevier. <https://reader.elsevier.com/reader/sd/pii/S0169204600001298?token=201AF44296A5FE3FCA4932F1DDD088F48BAE33DEE55C5F0AD6037E9FA6D7AB8777377135DB767FA96A87104385ED7A7E&originRegion=eu-west-1&originCreation=20230418111817>

Bevir, M. (2012). *Governance: A very short introduction*. OUP Oxford.

Buiten Ruimte. (2023, juli). *Buiten Ruimte*. [buitenruimte.info](https://www.buitenruimte.info). <https://www.buitenruimte.info/tips/maak-je-stad-hittebestendig-met-looptijd-tot-koelte-kaarten/>

Capano G, Howlett M, Ramesh M (2015) Bringing governments back in: governance and governing in comparative policy analysis. *J Comp Policy Anal: Res Pract* 17(4):311–321. <https://doi.org/10.1080/13876988.2015.1031977>

CBS. (2023). *Inwoners per gemeente*. Centraal Bureau voor de Statistiek. <https://www.cbs.nl/nl-nl/visualisaties/dashboard-bevolking/regionaal/inwoners>

Centraal Planbureau. (2018). *Waarom zijn de gemeente investeringen sinds 2009 sterk gedaald? : Uitgevoerd op verzoek van het ministerie van Binnenlandse Zaken en Koninkrijksrelaties, Financiën en de VNG*. In *cbp.nl*. Centraal Plan Bureau. <https://www.cpb.nl/sites/default/files/omnidownload/CPB-Notitie-11juli2018-Waarom-zijn-de-gemeente-investeringen-sinds-2009-sterk-gedaald.pdf>

Chapin SF III, Carpenter SR, Kofinas GP, Folke C, Abel N, Clark WC, Olsson P, Stafford Smith DM, Walker B, Young OR, Berkes F, Biggs R, Grove JM, Naylor RL, Pinkerton E, Steffen W, Swanson FJ (2010) Ecosystem stewardship: sustainability strategies for a rapidly changing planet. *Trends Ecol Evol* 25(4):241–249. <https://doi.org/10.1016/j.tree.2009.10.008>

Chetwynd, E., Chetwynd, F., & Spector, B. (2003). Corruption and poverty: A review of recent literature. *Management Systems International*, 600, 5-16.

Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design : choosing among five approaches* (Fourth edition. ed.). SAGE Publications.

Daniels, R. J., & Trebilcock, M. J. (1996). Private provision of public infrastructure: An organizational analysis of the next privatization frontier. *U. Toronto LJ*, 46, 375.

Davoudi, S., & Stead, D. (2002). *Urban-Rural Relationships: An Introduction and Brief history*. *ResearchGate*. <https://doi.org/10.2307/23287748>

De La Barrera, F., Reyes-Paecke, S., & Banzhaf, E. (2016). Indicators for green spaces in contrasting urban settings. *Ecological Indicators*, 62, 212–219. <https://doi.org/10.1016/j.ecolind.2015.10.027>

De Bastei. (2023). *Over operatie Steenbreek Nijmegen*. <https://www.debastei.nl/nl/steenbreek/steenbreek-nijmegen/over-operatie-steenbreek-nijmegen>

De Volkskrant. (2023, 15 maart). *Vandaag op het spel: de strijd om de ruimte in Nederland*. <https://www.volkskrant.nl/columns-opinie/vandaag-op-het-spel-de-strijd-om-de-ruimte-in-het-dichtbevolkte-land~b338d04e/?referrer=https://www.google.com/>

Erken, H., Van Es, F., & Van Harn, E. J. (2021, 8 november). *Nut en noodzaak van (publieke) kennisinvesteringen*. RaboResearch - Economisch Onderzoek. <https://economie.rabobank.com/publicaties/2021/november/nut-en-noodzaak-van-publieke-kennisinvesteringen/>

Folke C, Hahn T, Olsson P, Norberg J (2005) Adaptive governance of social-ecological systems. *Annu Rev Environ Resour* 30(1):441–473. <https://doi.org/10.1146/annurev.energy.30.050504.144511>

Frantzeskaki N, Loorbach D, Meadowcroft J (2012) Governing societal transitions to sustainability. *Int J Sustain Dev* 15(1):19–36. <https://doi.org/10.1504/IJSD.2012.044032>

Fujibe, F. (2008). Detection of urban warming in recent temperature trends in Japan. *International Journal of Climatology*, 29(12), 1811–1822. <https://doi.org/10.1002/joc.1822>

Geels FW (2014) Regime resistance against low-carbon energy transitions: introducing politics and power in the multi-level perspective. *Theory Cult Soc* 31(5):21–40. <https://doi.org/10.1177/0263276414531627>

Gemeente Arnhem. (2022, 4 augustus). Buurtinitiatieven in Arnhem. *ArcGIS StoryMaps*. <https://storymaps.arcgis.com/stories/c9462150863f44a39ac8983881679c97>

Gemeente Genneep & BügelHajema. (2019). Omgevingsvisie Gemeente Genneep: Samen maken we Genneep. In www.genneep.nl. <https://www.genneep.nl/sites/default/files/2022-06/Omgevingsvisie%20Genneep.pdf>

Gemeente Oss. (2023). 2.3 *Klimaatadaptatie*. [oss.nl. https://begroting2019.oss.nl/p2197/2-3-klimaatadaptatie](https://begroting2019.oss.nl/p2197/2-3-klimaatadaptatie)

Gemeente Wijchen. (2022). Strategisch kompas: Wijchen 2035 “De kracht van Wijchen”. In *Wijchen.nl*. <https://www.wijchen.nl/data/downloadables/4/0/3/raadsversie-strategisch-kompas-wijchen2035-oktober-2022-def-samengevoegd.pdf>

Groen Arnhem. (2022, 6 juli). *Boom Kwaliteitsteam Arnhem - Groen Arnhem*. Groen Arnhem. <https://groenarnhem.nl/projecten/boom-kwaliteitsteam-arnhem/>

Groene groeiregio - *Groene Metropoolregio*. (2023). <https://www.groenemetropoolregio.nl/opgaven/groene-groeiregio/>

Hajer, M. & Reijndorp, A. (2001). *Op zoek naar nieuw publiek domein: analyse en strategie*. Rotterdam: NAI Uitgevers.

Hildén M, Jordan A, Huitema D (2017) Special issue on experimentation for climate change solutions editorial: the search for climate change and sustainability solutions—the promise and the pitfalls of experimentation. *J Clean Prod* 169(15):1–15. <https://doi.org/10.1016/j.jclepro.2017.09.019>

Huynh-Quan-Suu, C. (z.d.). *Étymologie du terme “gouvernance”*. Europese Commissie. https://ec.europa.eu/governance/docs/doc5_fr.pdf

IUCN. (2011). *Draft Principles and Guidelines for integrating Ecosystem-based Approaches to Adaptation in Project and Policy Design: A Discussion Document*. <https://portals.iucn.org/library/efiles/documents/2011-064.pdf>

Kates RW, Travis WR, Wilbanks TJ (2012) Transformational adaptation when incremental adaptations to climate change are insufficient. PNAS 109(19):7156–7161. <https://doi.org/10.1073/pnas.1115521109>

Kitha, J., & Lyth, A. (2011). *Urban wildscapes and green space in Mombasa and their potential contribution to climate change adaptation and mitigation*. <https://reader.elsevier.com/reader/sd/pii/S2212095514000704?token=547C3D12F7059045A86C4722D99C6EE95C2BA68207922082CBD225FA85466A76B8CFA14A8A515E95917B8CD1C42D7725&originRegion=eu-west-1&originCreation=20230418113551>

Kivimaa P, Hildén M, Huitema D, Jordan A, Newig J (2017) Experiments in climate governance—a systematic review of research on energy and built environment transitions. J Clean Prod 169:17–29. <https://doi.org/10.1016/j.jclepro.2017.01.027>

Kivimaa P, Kern F (2016) Creative destruction or mere niche support? Innovation policy mixes for sustainability transitions. Res Policy 45(1):205–217. <https://doi.org/10.1016/j.respol.2015.09.008>

Kluck, J., Kleerekoper, L., Solcerova, A., Erwin, S., Klok, L., de Groot, M., & Koekoek, A. (2022). Distance to cool spots, a practical design guideline for heat resilient urban areas. Abstract from EGU General Assembly 2022, Vienna, Austria. <https://doi.org/10.5194/egusphere-egu22-10358>

Kooiman J, Jentoft S (2009) Meta-governance: values, norms and principles, and the making of hard choices. Public Adm 87(4):818–836. <https://doi.org/10.1111/j.1467-9299.2009.01780.x>

Kruuse, A. (2011). The green space factor and the green points system. GRaBS Expert Paper, 6, 1-12.

Loorbach D, Frantzeskaki N, Huffenreuter LR (2015) Transition management: taking stock from governance experimentation. J Corp Citizenship 2015(58):48–66

Lonsdale K, Pringle P, Turner B (2015) Transformative adaptation: what it is, why it matters and what is needed. UK Climate Impacts Programme, University of Oxford, Oxford.

Maas, J., Verheij, R. A., Groenewegen, P. P., De Vries, S., & Spreeuwenberg, P. (2006). *Green space, urbanity, and health: how strong is the relation?* Community of Health. <https://reader.elsevier.com/reader/sd/pii/S2212095514000704?token=3EFA5B8FD1235D2322CCE23502BAFCEBF10C58B51B5A95C3B9A2C34427DFC5B658862353583A0094EC68696530B5DF00&originRegion=eu-west-1&originCreation=20230418111317>

McCombes, S. (2023). Writing strong research questions | Criteria & examples. Scribbr. <https://www.scribbr.com/research-process/research-questions/>

Ministerie van Infrastructuur en Waterstaat. (2013, 29 mei). *Roles and responsibilities of Central Government*. Environment | Government.nl. <https://www.government.nl/topics/environment/roles-and-responsibilities-of-central-government>

Ministerie van Financiën. (2021, 14 januari). Q5 Is de verhouding tussen kosten en beleidsprestaties optimaal? (ex post, enkelvoudig). Toolbox Beleidsevaluaties. <https://www.toolboxbeleidsevaluaties.nl/documenten/vragen-en-antwoorden/q5-is-de-verhouding-tussen-kosten-en-beleidsprestaties-optimaal-ex-post-enkelvoudig>

Ministerie van Financiën. (2023, 28 maart). *Onderzoeksmethoden*. Toolbox Beleidsevaluaties. <https://www.toolboxbeleidsevaluaties.nl/onderzoeksmethoden>

Munang, R., Thiaw, I., Alverson, K., Mumba, M., Liu, J., & Rivington, M. (2013). *Climate change and ecosystem-based adaptation: a new pragmatic approach to buffering climate change impacts*. <https://reader.elsevier.com/reader/sd/pii/S2212095514000704?token=547C3D12F7059045A86C4722D99C6EE95C2BA68207922082CBD225FA85466A76B8CFA14A8A515E95917B8CD1C42D7725&originRegion=eu-west-1&originCreation=20230418113551>

Nasir, M. I. M., & Rahim, A. A. (2023). Climate Adaptation Strategy via Urban Green Space: A Bibliometric Analysis. *Journal of Asian Geography*, 2(1), 31-36.

Nishizawa, T. (2018). Infrastructure Investment and Finance in Asia. *Public Policy Review*, 14(5), 925-954.

Nijmegen European Green Capital. (2018). Gemeente Nijmegen. <https://www.nijmegen.nl/languages/english/nijmegen-european-green-capital/>

NOS. (2023b, 8 maart). Planbureau: kabinet moet scherpere keuzes maken in de strijd om ruimte. NOS. <https://nos.nl/artikel/2466745-planbureau-kabinet-moet-scherpere-keuzes-maken-in-de-strijd-om-ruimte>

NOS. (2023b, 17 juli). “Wijken in Nederland nog altijd onvoldoende voorbereid op extreem weer”. NOS. <https://nos.nl/artikel/2483186-wijken-in-nederland-nog-altijd-onvoldoende-voorbereid-op-extreem-weer>

NOS. (2023c, juli 11). Italië, Spanje en Noord-Afrikaanse landen maken zich op voor extreme hitte. NOS. <https://nos.nl/collectie/13871/artikel/2482422-italie-spanje-en-noord-afrikaanse-landen-maken-zich-op-voor-extreme-hitte>

NOS. (2023d, juli 15). Weercode rood in vijftien Italiaanse steden vanwege extreme hitte. NOS. <https://nos.nl/artikel/2482891-weercode-rood-in-vijftien-italiaanse-steden-vanwege-extreme-hitte>

NOS. (2023e, juli 15). Lokaal 44 graden in Griekenland, Akropolis 's middags dicht om hitte. NOS. <https://nos.nl/artikel/2482869-lokaal-44-graden-in-griekenland-akropolis-s-middags-dicht-om-hitte>

NOS. (2023f, juli 10). 61.000 hittedoden in Europa door de hete zomer van 2022. NOS. <https://nos.nl/artikel/2482316-61-000-hittedoden-in-europa-door-de-hete-zomer-van-2022>

NOS. (2023g, juli 14). Oversterfte in juni onder senioren, CBS legt link met hitte. NOS. <https://nos.nl/artikel/2482728-oversterfte-in-juni-onder-senioren-cbs-legt-link-met-hitte>

Nowak, D. J., & Crane, D. E. (2022). *Carbon storage and sequestration by urban trees in the USA* ([https://doi.org/10.1016/S0269-7491\(01\)00214-7](https://doi.org/10.1016/S0269-7491(01)00214-7)). ScienceDirect. <https://www.sciencedirect.com/science/article/pii/S0269749101002147>

OECD. (2011). Government at a glance: General government investment. In *clevelandfed.org* (10.26509/frbc-wp-201217).

Olsson P, Galaz V, Boonstra WJ (2014) Sustainability transformations: a resilience perspective. *Ecol Soc* 19(4):1. <https://doi.org/10.5751/ES06799-190401>

Plummer R (2013) Can adaptive comanagement help to address the challenges of climate change adaptation? *Ecol Soc* 18(4):2. <https://doi.org/10.5751/ES-05699-180402>

Polit, D., & Beck, C. (2012). Rigor and validity in quantitative research. *Nursing research: Generating and assessing evidence for nursing practice*, 236-256.

QUT Design Lab, & Swann, L. (2020, 29 september). *Content Analysis and Atlas.ti Analysing Textual Data by Dr Levi Swann* [Video]. YouTube. <https://www.youtube.com/watch?v=va1r8IL-scg>

Raven R, van den Bosch S, Weterings R (2010) Transitions and strategic niche management: towards a competence kit for practitioners. *Int J Technol Manag* 51(1):57–74. <https://doi.org/10.1504/IJTM.2010.033128>

Ren, G. Y., Chu, Z. Y., Chen Z. H., Ren, Y.Y., 2007. Implications of temporal change in urban heat island intensity observed at Beijing and Wuhan stations. *Geophys. Res. Lett.* 34, L05711.

Saunders, M, & Lewis, P. (2018). *Doing research in business and management* (second edition). Pearson.

Saunders, M., Lewis, P., & Thornhill, A. (2016). *Research methods for business students* (seventh edition). Pearson.

Sørensen E (2006) Metagovernance: the changing role of politicians in processes of democratic governance. *Public Adm* 36(1):98–114. <https://doi.org/10.1177/0275074005282584>

Spanjar, G., Bartlett, D., Schramkó, S., & Kluck, J. (2022a). *The Urban Heat Atlas: A standardised assessment for mapping heat vulnerabilities in Europe*. Hogeschool van Amsterdam, Kenniscentrum Techniek.

Spanjar, G., Kluck, J., Erwin, S., Schramkó, S., Föllmi, D., & Bartlett, D. (2022b). A multi-level Thermal Comfort Assessment (TCA) to identify and mitigate heat stress risks in urban areas. 800-801. Abstract from AESOP Annual Congress, Tartu, Estonia. <https://aesop2022.eu/en/abstract-book/>

Stoddard, I., Anderson, K., Capstick, S., Carton, W., Depledge, J., Facer, K., Gough, C., Hache, F., Hoolohan, C., Hultman, M., Hällström, N., Kartha, S., Klinsky, S., Kuchler, M., Lövbrand, E., Nasiritousi, N., Newell, P., Peters, G. P., Sokona, Y., . . . Williams, M. (2021). Three decades of climate mitigation: Why haven't we bent the global emissions curve? *Annual Review of Environment and Resources*, 46(1), 653–689. <https://doi.org/10.1146/annurev-environ-012220-011104>

Stone, B. (2007). Urban and rural temperature trends in proximity to large US cities: 1951–2000. *International Journal of Climatology*, 27(13), 1801–1807. <https://doi.org/10.1002/joc.1555>

Strijd om de ruimte. (2023). Stadszaken.nl. <https://stadszaken.nl/strijd-om-de-ruimte#:~:text=Strijd%20om%20de%20Ruimte%20%2D%20Stadszaken.nl&text=In%20onze%20steden%20woedt%20een,drukke%20door%20pret%20en%20vermaak>.

Van Berk, D. (2023, 22 april). *Duurzaam en groen wonen: deze woningen in Nijmegen-Noord gaan binnenkort in de verkoop - indebuurt Nijmegen*. indebuurt Nijmegen. <https://indebuurt.nl/nijmegen/ondernemersbijdragen/duurzaam-en-groen-wonen-deze-woningen-in-nijmegen-noord-gaan-binnenkort-in-de-verkoop~220502/>

Vargo, J., Stone, B., Habeeb, D., Liu, P., & Russell, A. (2016). The social and spatial distribution of temperature-related health impacts from urban heat island reduction policies. *Environmental Science & Policy*, 66, 366-374.

Van Popering-Verkerk, J., Molenveld, A., Duijn, M., Van Leeuwen, C., & Van Buuren, A. (2022). A Framework for Governance Capacity: a broad perspective on steering efforts in society. *Administration & Society*, 54(9), 1767–1794. <https://doi.org/10.1177/00953997211069932>

Westley FR, Tjornbo O, Schultz L, Olsson P, Folke C, Crona B, Bodin Ö (2013) A theory of transformative agency in linked social-ecological systems. *Ecol Soc* 18(3):27. <https://doi.org/10.5751/ES-05072-180327>

Williams, D. S., Rosendo, S., Sadasing, O., & Celliers, L. (2020). Identifying local governance capacity needs for implementing climate change adaptation in Mauritius. *Climate Policy*, 20(5), 548-562.

Wise R, Fazey I, Stafford Smith M, Park S, Eakin H, Archer Van Garderen E, Campbell B (2014) Reconceptualising adaptation to climate change as part of pathways of change and response. *Glob Environ Chang* 28(4):325–336. <https://doi.org/10.1016/j.gloenvcha.2013.12.002>

World Health Organisation [WHO]. (2016). Urban Green Space and Health: Intervention Impacts and Effectiveness. In *who.int*. World Health Organisation. <https://www.who.int/europe/publications/m/item/urban-green-space-and-health--intervention-impacts-and-effectiveness>

Yu, Z., Guo, X., Jørgensen, G., & Vejre, H. (2017). How can urban green spaces be planned for climate adaptation in subtropical cities?. *Ecological Indicators*, 82, 152-162.