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Master's Thesis for the Environment and
Society Studies program

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GOVERNING GREEN CITIES

EXPLORING GOVERNING STRATEGIES FOR MAINSTREAMING DUTCH
NATURE-BASED SOLUTIONS

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SUMMARY

As climate changes and urbanization progresses, cities are forming the places where the need for sustainable development is highest. At the same time, the therefor required resources can be found here. Sustainable developments are often unique and depend on their local spatial and socio-political context. Knowledge gaps made it necessary to further investigate the differences in these local urban contexts in relation to the development of sustainability, including Nature-Based Solutions (NBS).

As part of the local socio-political context, this thesis focused on NBS, specifically in relation to governing strategies and mainstreaming. NBS can contain both green and blue aspects of nature and can trigger social and technological innovation in cities, further stimulating urban sustainable development. They promote new innovative planning methods and involve the participation of other stakeholders through new governing strategies. In other words, Nature-based Solutions can stimulate innovation and therefore accelerate the sustainability transition. However, according to the European Commission and concerned scientists, the level of integration is still running behind, especially on the local municipality scale. Since mainstreaming is a much advocated goal for NBS, it would be interesting to know how to get there and follow the process of mainstreaming as efficiently as possible. Therefore, this research aimed to create a clear image of the way mainstreaming of Nature-Based Solutions relates to the various governing strategies that are applied in Dutch municipalities. Through this research, the most suitable governing strategies for a government stakeholder could be identified for the purpose of mainstreaming climate adaptation and mitigation measures, by following the research question below:

To what extent do different (local) governing strategies influence the mainstreaming of different types of Nature-based Solutions?

This thesis is structured as an exploratory cross-sectional research. The data collection for this research is executed in cooperation with the Netherlands Environmental Assessment Agency (NEAA). Together with the NEAA, a database with extensive information about 199 NBS throughout the 50 largest municipalities in the Netherlands was built by combining two different research methods. First, a content analysis is applied, in order to objectively analyze and systematically recognize all of the most important features of an NBS. However, as Dutch NBS are often not widely documented, additional surveys were used, directed to either the initiator or leader of an NBS. These surveys filled in the gaps where any online information was missing, while also providing more contextual information.

The retrieved data from the content analyses and surveys were analyzed by using the pre-developed theoretical frameworks: the first is adopted from the European NATURVATION project, including the different types of NBS. Governing strategies are identified through the use of the modes of governing theory and the governance arrangements theory. Lastly, criteria for determining mainstreaming performances are identified through a literature review, as no widely accepted theory exists that applies to NBS specifically. This first stage of analysis transformed the data,

enabling further analyses through the use of statistical tests to be able to recognize any relationships and correlations between all of the variables and indicators.

These tests revealed that governing through networks is the most prevalent governing strategy among Dutch NBS. More top-down governing strategies, including governing through networks, are applied mainly to generally larger scale public spaces that require more knowledge and other resources, such as 'urban green space connected to grey infrastructure', 'parks and (semi-) natural urban green areas', 'blue areas' and 'green areas for water management'. On the other hand, more bottom-up governing strategies, including self-governing and governing through enabling, are significantly more prevalent in NBS types including allotments and community gardens, that are often small scaled and / or not necessarily on municipal land.

When combining the results of all the variable combinations together, it can be concluded that there is one specific policy strategy that best guarantees mainstreaming of almost all types of NBS. This is the governing strategy of governing through networks. This can be explained by the fact that networks make it possible to bring an increased amount of resources together, including financial resources, land, money, etc. This helps to achieve more ambitious goals and possibly increase the spatial scale. This effect can be further enhanced by the increased likelihood that similar ideas will be transmitted through stakeholder within the network. Moreover, stakeholders in a network depend on each other, requiring them to be accountable to each other. This accountability can be achieved by formulating clear social, economic and / or environmental goals and / or by making an extensive iterative time planning, also increasing the time scale of an NBS initiative.

However, this conclusion comes with a few nuances. First, as the above explanation might already indicate, most mainstreaming criteria are somehow interdependent, which especially helps to boost scores for governing through networks in the first place. Secondly, the literature used for the theoretical framework has a very policy-oriented vision on mainstreaming. Therefore, bottom-up governing strategies, especially in the form of societal self-governing, have by definition no chance of success, as the government is usually not a stakeholder within these NBS. Lastly, the governing strategy of governing through networks does not show high mainstreaming scores for every criterion; it generally lacks citizen involvement. As (local) governments often have limited resources, they largely depend on efficiency. However, that is at the expense of mainstreaming. This efficiency is reflected in the lack of other stakeholders involved in the decision-making process, especially in the form of citizens.

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Dear readers,

This thesis marks the end of my time at the ESS Master's program and the NEAA. It has been an interesting learning process, both personally and professionally. I have gained a lot of new insights in myself, about what my strengths and weaknesses are and where my interests lie. I have gained many new insights into alternative forms of climate adaptation in the form of Nature-Based Solutions, of which the importance has only appeared to have increased over the past two increasingly drier and warmer years.

Therefore, I would first like to express my gratitude to my supervisor Sietske Veenman. Thank you so much for your continuous support throughout this lengthy process, from the struggles with the scope of this research to turning all of the data into well formulated results. Also, I would like to thank you for all your advice and critique of my work in order to improve the quality of this thesis.

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It took a while, but I think I am ready to leave the safe and comfortable student life behind and go out into the big wide world to make a real contribution to climate change challenges, anywhere in the world. On to the next adventure!

Thank you all and enjoy your reading,

Laura van de Beld

Ede, June 2020

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1. INTRODUCTION

In past centuries, cities around the world have seen their area and inhabitants grow strongly. According to the United Nations Department of Economic and Social Affairs (2018), more than 55% of the global population currently lives in cities. By 2050, this percentage will most likely have increased further to 68%. Cities and city life can bring many social and economic benefits for many people. However, the rapid degree of urbanization also poses several challenges to make and keep the living environment as comfortable and livable as possible for as many people as possible, now and in the future. For example, as the number of urban inhabitants increases, cities have to provide for increased amounts of grey infrastructure, such as housing and road networks (Dorst et al., 2019). However, this crucial grey infrastructure also comes with its downsides; it can cause increasing urban temperatures, increased risk of flooding, loss of biodiversity, food poverty, pollution and deterioration of the physical and mental health of urban residents (Dorst et al., 2019; Kraas, 2007). The more densely populated an area becomes, the worse these consequences often become (Davies et al., 2017). Moreover, these negative effects are further reinforced by climate change. This causes the temperatures and chance of flooding to increase, on its turn posing further threats to human health (van den Bosch & Ode Sang, 2017; Kabisch et al., 2016). In response to these negative effects and threats, the value of nature in the city is increasingly recognized as a possible solution (Raymond et al., 2017), as nature has the capacity to positively influence the economic, social and ecological aspect of sustainability (IUCN, 2012).

These aspects of nature in the city are often referred to as Nature-Based Solutions. The term Nature-Based Solutions (NBS) is a relatively new term and is increasingly used in both scientific and social contexts (Raymond et al., 2017). Unlike other commonly used terms relating to nature in the city (e.g. Green Infrastructure and Ecosystem Services), the term NBS is a largely overarching term with a broad focus, including both green and blue aspects of nature (Kabisch et al., 2016; Nesshöver et al., 2017). In addition, NBS respond to a variety of (imminent) problems: including social, economic and ecological. However, despite the newness of the concept, NBS are increasingly receiving attention from both scientists and policymakers (Nesshöver et al., 2017; Raymond et al., 2017), causing the term to be understood and applied by different stakeholders in different ways (Nesshöver et al., 2017). In general, as defined by The European Commission and Directorate-General for Research and Innovation (2015), NBS are:

“living solutions inspired by, continuously supported by and using nature, which are designed to address various societal challenges in a resource-efficient and adaptable manner and to provide simultaneously economic, social, and environmental benefits”.

Therefore, NBS also differ from conventional grey infrastructure through their co-benefits; by solving multiple problems and increasing the quality of life in urban areas at the same time (Nesshöver et al., 2017; Raymond et al., 2017). They can be implemented in the urban environment in various ways; areas can be greened by means of green roofs, city parks, urban agriculture, etc. (NATURVATION, 2017). As an example, urban agriculture can address economic, social and ecological problems in society, i.e. through new employment opportunities, physical and mental health benefits and improvement of the local air quality (Gezgin, 2013).

1.1. RESEARCH PROBLEM STATEMENT

As mentioned, cities are pre-eminently seen as the locations for implementing sustainable development; cities are places where the need for multiple forms of sustainable development is highest and where the required resources are available. Sustainable developments are often unique and depend on their local spatial and socio-political context. According to Hansen and Coenen (2015), it is necessary to further investigate the differences in these local urban contexts in relation to the development of sustainability, including Nature-Based Solutions.

As part of the local socio-political context, this thesis will therefore focus on NBS, specifically in relation to governing strategies and mainstreaming. According to Faivre et al. (2017), NBS can trigger social and technological innovation in cities, further stimulating urban sustainable development. They promote new innovative planning methods and involve the participation of other stakeholders through new governing strategies. In other words, Nature-based Solutions can stimulate innovation and therefore accelerate the sustainability transition.

One prerequisite for this sustainability transition is that NBS or other environmental or climate measures and / or visions are integrated in policy, also referred to as the process of 'mainstreaming'. For example, NBS are implemented in the European political context (Faivre et al., 2017). Here, NBS can be seen as a new policy discourse, in which there is more room and attention for biodiversity and ecosystem services, climate change and urban and economic sustainability (Dorst et al., 2019; Kabisch et al., 2016). The European Commission integrated the concept of NBS into its research and innovation program 'Horizon 2020'; a financial instrument that aims to drive sustainable projects and initiatives. This integration of NBS into European climate policy is a large step into innovating and mainstreaming the concept for green economies (European Commission, 2015; Faivre et al., 2017).

The mainstreaming of NBS is of importance for several reasons:

1. It reduces the climate risk on the local level;
2. Mainstreaming strategies guarantee sustainable implementation of NBS;
3. Real sustainable change is only achieved in combinations, in which different types of NBS are used together, and in which they function through networks and systems;
4. The experiences that results from the mainstreaming of NBS can be used in developing the mainstreaming process of other initiatives, specifically regarding climate change mitigation (Wamsler et al., 2017).

However, according to the European Commission and concerned scientists, the level of integration is still running behind, especially on the local municipality scale. Since mainstreaming is a much advocated goal for NBS, it would be interesting to know how to get there and follow the process of mainstreaming as efficiently as possible. Therefore, 500 case studies are being conducted in 50 different municipalities throughout the Netherlands in this thesis. These Dutch municipalities differ from each other based on several factors, including both their physical and institutional context.

1.2. RESEARCH QUESTIONS

This research aims to create a clear image of the way mainstreaming of Nature-Based Solutions relates to the various governing strategies that are applied in Dutch municipalities. Through this research, the most suitable governing strategies can be identified for the purpose of mainstreaming climate adaptation and mitigation measures.

This leads to the following research question:

To what extent do different (local) governing strategies influence the mainstreaming of different types of Nature-based Solutions?

This main research question is divided into three sub questions that need to be answered first:

1. *What governing strategies are applied to the different types of Nature-based Solutions?*
2. *How are the different types of Nature-based Solutions being mainstreamed?*
3. *To what extent do different governing strategies influence mainstreaming?*

The first sub question will specifically look at how the NBS studied were established and, in particular, to what extent the (local) government played a role in its establishments, what this role exactly entailed and how market and citizen stakeholders were involved. Therefore, theories of modes of governing and political hierarchy will be combined and applied.

Subsequently, different types of NBS are compared within the second sub-question, based on their mainstreaming criteria; the implementation of NBS in society through regulation, legislation and policy.

The final sub question will make a link between the different governing strategies recognized within the establishments of NBS throughout the Netherlands and its mainstreaming characteristics.

The answers to the three sub questions will be combined to formulate a clear answer to the main question of this thesis.

1.3. RELEVANCE

1.3.1. SCIENTIFIC RELEVANCE

The concept of Nature-based Solutions is relatively new, as part of the sustainable development process especially in urban areas (van der Jagt, n.d.). Therefore, no extensive research has yet been done on the concept and the way it relates to society and its surroundings. Many different research gaps have been recognized and identified. According to Kabisch et al. (2016), “four main knowledge gaps were identified (...) relating to: (1) the effectiveness of NbS; (2) relationship between NbS and society; (3) design of NbS; and (4) implementation aspects.” So far, most literature has mainly focused on urban green and blue for environmental concerns; the role of NBS goes further, aiming

to address the entire sustainability framework, also including social and economic factors (van der Jagt, n.d.; Muñoz-Erickson et al., 2016).

Moreover, the most ideal roads to mainstreaming remain unclear. The scientific research that has been done on environment and climate change governing and mainstreaming do not share a uniform vision on the ideal governing strategies towards mainstreaming. On the one hand, multiple literature studies state that governance and citizen participation is key to integrating NBS in society (Frantzeskaki, 2019; van der Jagt et al, 2017; Wamsler et al., 2014). On the other hand, Mees et al. (2013) compared multiple different governing strategies that are being practiced in different European cities, specifically regarding the number of green roofs in these cities. In contrast to what many other literature studies state, she concludes that the more authoritative a local government is, the higher the share of green roofs. This shows the inconsistency of the suitability of certain governing strategies for integrating Nature-based Solutions in society and the need for further research regarding this subject.

1.3.2. SOCIETAL RELEVANCE

NBS are known to reduce vulnerability to climate change and increase resilience (van der Jagt et al., 2017; Kabisch et al., 2016). Apart from this, NBS also serve socio-economic and cultural goals (Faivre et al., 2017). Therefore, NBS have the capacity to maintain and improve well-being in urban areas (Kabisch et al., 2016; Panno et al., 2017) and protect both its human, animal and plant inhabitants and its physical attributes (Raymond et al., 2017). Especially concerning the increasing threat of climate change impact, it is interesting and relevant for society how the process of mainstreaming of climate measures such as NBS can develop most efficiently. Climate policy is one of the most important factors within the concept of mainstreaming, making a top-down governing perspective a relevant focus for this research.

Specifically the focus on Dutch municipalities is suitable here, since political power in the Netherlands is largely decentralized, meaning that Dutch municipalities have much political power, serving as small-scaled separate political systems (Schaap, 2012).

Moreover, within such a decentralized political system, material and data such as scientific articles or theses are useful and could possibly be influential. Along with municipalities, non-state actors are getting increasingly involved with applying pressure higher up the political hierarchy; municipalities and non-state actors are mostly guided by the voices of the citizens, instead of minimizing costs and maximizing benefits. Especially subjects like governing strategies are relevant in this case to be able to outline possible future pathways. By combining this with the subject of mainstreaming, the data can also be used as arguments regarding the feasibility of increasing and improving urban nature. Moreover, these arguments can not only be used to stimulate the national government, but can also be relevant on the international scale, for example within political climate conferences and, more specifically, the 2020 UN Biodiversity Conference (T. Dassen, Personal Communication, 26 April 2019).

1.4. THESIS OUTLINE

From this introduction chapter onward, the rest of this thesis is structured as follows. First, the theoretical chapter will further define and elaborate on the concept of Nature-Based Solutions. In addition, theories on governing strategies and mainstreaming will be discussed, after which all three concepts will be operationalized and merged into a conceptual framework.

Secondly, the methodological chapter explains and justifies the different methods that were chosen for the execution of this research. Moreover, it also discusses what information is collected with these methods and how this information is analyzed.

Third, in the results chapter, an overview of the retrieved and analyzed data is provided. This will help to determine the occurrence of specific relationships between the variables and its indicators.

The last chapter draws conclusions from the results and analyses from the previous chapters, answering the main questions of this research. Also, this chapter proposes some recommendations for further research and practical implementation and critically reflects on the research that was carried out.

2. THEORY

This theory chapter discusses the existing concepts and theories that play a role within the components of this research. First, the concept of Nature-Based Solutions and its applications will be elaborated. Subsequently, the theories behind governing strategies and mainstreaming are discussed and applied specifically to the research in this thesis. Ultimately, these theories and concepts are merged into one conceptual framework. This chapter has two specific goals, which will be met through this process; it will firstly serve as a literature review and a source of background information behind the used concepts and the processes behind the development of NBS and environmental policy. Secondly, this chapter will aim for an operationalization of the relevant variables and indicators for the execution of this research.

2.1. NATURE-BASED SOLUTIONS

This section describes the background information for the concept of Nature-Based Solutions. This includes the development of the concept, the existing definitions of NBS and the applications of NBS. The resulting information will then be used for the operationalization of the concept for the research in this thesis.

2.1.1. DEFINING NATURE-BASED SOLUTIONS

The concept of Nature-based Solutions was first introduced and applied by the World Bank and later by the International Union for Conservation of Nature and Natural Resources (IUCN) in 2008/2009 (MacKinnon et al., 2008; IUCN, 2009). The emphasis was placed on the importance of protecting biodiversity to combat climate change, which is one of the most important aspects of NBS (Kabisch et al., 2016; Pauleit, 2017). In the run-up to the Paris Agreement in 2015, the concept gained increased recognition (Pauleit, 2017). NBS have the capacity to address and combat global environmental and environmental problems; they are seen as a way to address both climate mitigation and adaptation, to protect water, food and energy sources, to stimulate economic growth and thereby reduce poverty through possible application on a very local scale (Kabisch et al., 2016; Pauleit, 2017).

Nature-based Solutions consist of multiple characteristics that distinguish the concept from similar well known concepts, including Ecosystem-Based Adaptation (EbA), Green (and Blue) Infrastructure (GI) and Ecosystem Services (ES).

First, the concept of NBS goes beyond climate mitigation and adaptation, which are key subjects in EbA, GI and ES concepts (Kabisch et al., 2016; Pauleit, 2017). What is unique about NBS, is that it is an overarching concept for a number of different policy aspects and measures, making it a largely transdisciplinary concept (Raymond, 2017). Although the basis is still regarding climate mitigation and adaptation through ecosystem and biodiversity conservation, the ultimate objectives reach further; from decreasing levels of climate risk to simultaneously enhancing green economic growth and sustainable development of society as a whole (Maes & Jacobs, 2015).

Secondly, the term 'nature' refers to every aspect that is considered to be part of nature. A Nature-based Solution can be based on and built up from any natural phenomenon. This can include trees, water, sand, bushes, etc. (NATURVATION, 2017), which can result in NBS such as tiny urban forests, wadi's, natural sound walls, dykes, green roofs, etc. As long as the natural phenomenon is built with an objective that increases sustainable development; these objectives can consist of enhancing biodiversity, reducing harmful air pollution, retaining rainwater, nature education, increasing neighborhood livability, etc. (Maes & Jacobs, 2015; NATURVATION, 2017)

Third, NBS promote bottom-up initiatives. In contrast to many other nature conservation approaches, NBS focus on small scaled initiatives that keep in mind the interests and needs of all involved actors. Therefore, governance approaches including bottom-up initiatives and intensive citizen participation in all implementation stages are being stimulated in literature (European Commission, 2016; Raymond, 2017).

Lastly, a central goal of NBS is to mainstream the NBS initiatives into policy and the rest of society, and upscale it further, also beyond the European borders (Pauleit, 2017; Wamsler et al., 2017). Through the very local implementation and the high level of action, this seems to be an achievable goal (Kabisch et al., 2016); the concept of NBS is increasingly being recognized and used in policymaking, as a completely new interest in urban nature or gaining ground from concepts as GI, EbA and ES. For example, the 'Horizon 2020' program by the European Commission integrates NBS in European policy, which proves to be a large step towards the mainstreaming of NBS (European Commission, 2015; Faivre et al., 2017). However, especially on the local scale, the level of integration of NBS in societies is still lower than the European Commission and concerned scientists aim it to be.

These characteristics of NBS lead to the following definition of NBS, as proposed by the European Commission in 2015:

"...aim to help societies address a variety of environmental, societal and economic challenges in a sustainable way. They are actions which are inspired by, supported by or copied from nature."
(European Commission, 2015)

Through this definition, one aims to extend the objectives further towards sustainable and climate-proof developments in general by means of innovative and universally integrable solutions, including people, planet and profit (European Commission, 2015; Snep & Stuiver, n.d.). This definition will be used for the operationalization and execution of the research in the rest of this thesis.

2.1.2. NATURE-BASED SOLUTIONS AND RELATIONS WITH SIMILAR CONCEPTS

The term Nature-Based Solutions is not a singular concept in the field of environmental and ecosystem management; it is based on and related to other similar concepts, the definition of which often largely overlaps with that of NBS. In fact, the concept of NBS goes beyond related concepts ; it makes use of these by taking all the strengths of the other related concepts and merge them into one integral concept of NBS. It is relevant to examine the related concepts not only because the term NBS is developed from these concepts, but also since these are often used as synonyms in the content analysis in this study, as the related concepts are older and often more commonly known

and used. In existing literature, the following of these concepts are used most commonly in relation to NBS:

1. Ecosystem Services (ES): ES as a concept is one of the most commonly used in relation to NBS in scientific literature. Moreover, as the concept was first introduced in the 1970s, it is the oldest concept of the ones discussed here (Gómez-Baggethun et al. 2010). ES are the functions that ecosystems and natural factors have for the well-being of people and their environment (Faivre et al., 2017). Ecosystems have the capacity to produce food, ensure clean drinking water and healthy air quality and to protect citizens against natural disasters; trees and other types of vegetation filter the air and form a natural barrier against flooding, because it retains water and increases infiltration. Moreover, ecosystems have a socio-cultural function, in which nature can fulfill educational and creative purposes (Pauleit et al., 2017). The concept was originally developed to make people increasingly aware of the value of ecosystems and nature and to strengthen the role and value of nature in decision-making and policy (Gómez-Baggethun et al. 2010; Haase et al., 2014).

Ecosystem Services can help to design and successfully implement NBS, as it provides a clearer and broader picture of nature and its functions, classified in the categories 'supporting', 'provisioning', 'regulating' and 'cultural' ecosystem services. This provides a framework that helps within NBS to establish clear objectives and policy goals and offers tools and indicators to monitor these (Pauleit et al., 2017). For example, one of nature's provisioning ecosystem services is the increase in genetic diversity. This can be an important objective within policy, and offers a factor with which performance can be measured. However, the reason why the ES concept is only slowly being included in urban policy and development is because it offers relatively little attention to the practical design of a green initiative. The NBS concept therefore seeks to supplement this, by operationalizing promoting and executing ES in real-world situations (Faivre et al., 2017).

2. Green (and Blue) Infrastructure (GI/BI): GI and BI are most commonly used in relation to NBS in society and urban planning. These terms were first introduced in the 90s regarding concerns about the presence of green areas and aspects in urban areas during the uncontrolled urban sprawl that took place mainly in the US (Walmsley, 2006). GI/BI refers to the implementation of green and blue aspects in spatial planning and the development of infrastructure (Benedict and McMahon, 2002). Instead of the original grey infrastructure, value is also attached to parks, water, green roofs and verges, etc., within which the aforementioned ES play an important role (Farrugia et al., 2013).

GI and BI are deeply embedded in urban spatial planning, which can support NBS with the practical design and implementation; a factor that was missing within ES. The concept of NBS partly originates from GI / BI and is often used as a synonym, but goes deeper and broader; the concept of GI does not necessarily involve existing or imminent challenges and problems, which, in contrast, is at the core of NBS (Pauleit et al., 2017). For example, façade greens can function as an interruption for grey infrastructure within grey infrastructure, while within NBS, these will be able to function as a solution for (imminent) problems, such

as biodiversity loss and a lacking social cohesion in urban neighborhoods. GI does not necessarily keep this into account.

3. Ecosystem-Based Adaptation (EbA): EbA was first introduced as a concept during the United Nations Framework Convention on Climate Change in 2008, which laid a large focus on the consequences of climate change in the global south. EbA was mentioned as a possible strategy for people to adapt to these consequences, specifically through the use of biodiversity and ecosystem services (UNFCCC, 2011). Over time, the concept has been further developed and more widely implemented, also in the global North. Moreover, in addition to the benefits for climate adaptation, possible co-benefits of these adaptation strategies are increasingly being taken into account in the social, economic and cultural field (Pauleit et al., 2017).

EbA is a useful concept within NBS, as it can help to provide NBS with a clear strategy on how to use nature for climate adaptation. Similarly to the concept of GI, NBS partly originates from EbA, but further broadens it; whereas EbA only focuses on climate adaptation strategies through nature, NBS extends this to a wide range of solutions, including climate mitigation strategies and separate social and economic solutions and benefits (Naumann et al., 2011). For example, an NBS such as a neighborhood pocket park can make use the concept of EbA as a strategy to make an urban area more resilient to floods. Besides, the concept of NBS can bring its own additional input, through broadening this strategy towards increasing climate mitigation (i.e. through better air quality) and increasing social cohesion in urban neighborhoods.

By combining all of the above concepts into one concept of NBS, it becomes a strong, widely applicable concept and tool. It takes elements and criteria from both ES, GI and EbA, making it an umbrella for these three concepts; it takes its performance criteria from the concept of ES, its strategic elements from the concept of EBA and its spatial planning elements from the concepts of GI and BI (Eisenberg & Polcher, 2019), as shown on figure 2.1 below.

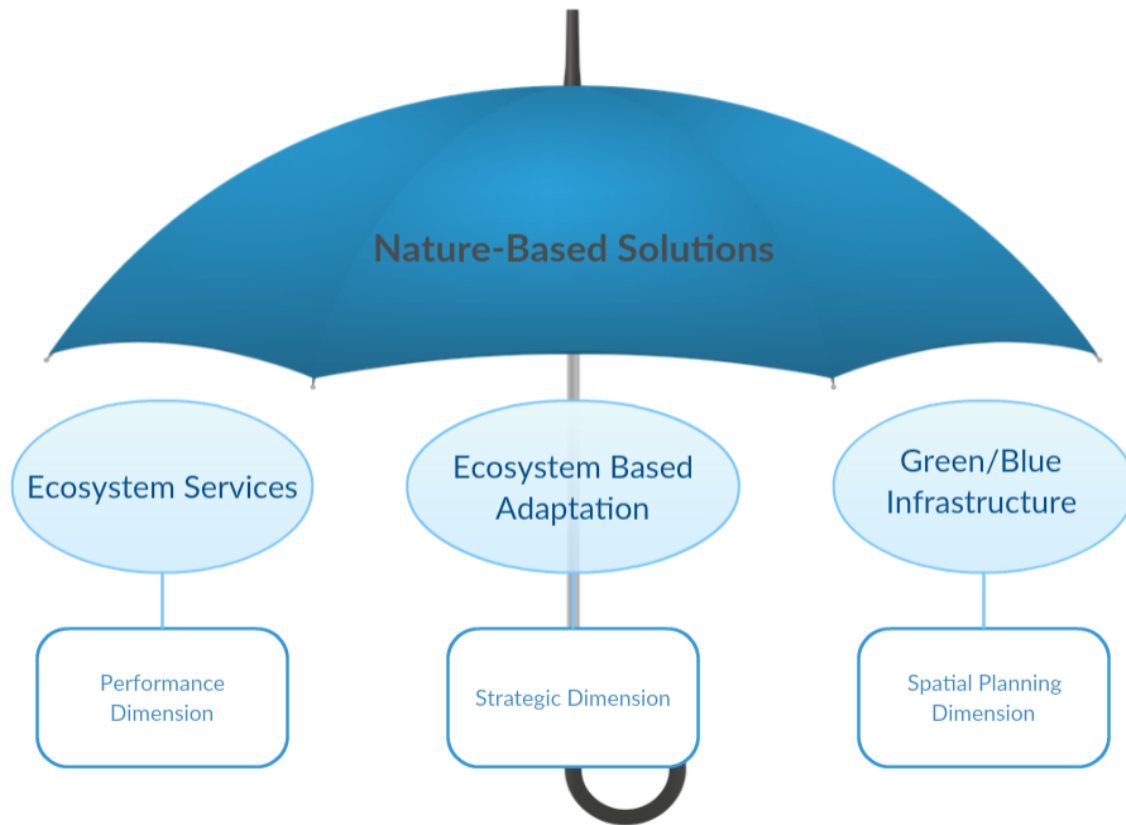


FIG. 2.1. NATURE-BASED SOLUTIONS AS AN UMBRELLA TERM (EISENBERG & POLCHER, 2019; PAULEIT ET AL., 2017)

Also, NBS adds some new elements, regarding its focus on long-term solutions, instead of short-term solutions, contributing to the sustainability transition in urban planning (Faivre et al., 2017). These new elements, in combination with all strengths and advantages of the above concepts, conclude to the following list of advantages of NBS, which have been formulated and listed by the IUCN:

1. *"Delivers an effective solution to a major global challenge using nature;*
2. *Provides biodiversity benefits in terms of diverse, well-managed ecosystems;*
3. *Is cost effective relative to other solutions;*
4. *Is easily and compellingly communicated;*
5. *Can be measured, verified and replicated;*
6. *Respects and reinforces communities' rights over natural resources and*
7. *Harnesses both public and private sources of funding."* (van Ham, 2014)

2.1.3. ELEMENTS AND CHARACTERISTICS OF NATURE-BASED SOLUTIONS

As concluded in the previous sections, the NBS concept is a broad umbrella concept, causing it to be challenging to recognize and distinguish NBS. It poses question such as: what is considered 'nature', from what size/scale is an initiative considered NBS and what type of solutions should be addressed? Therefore, criteria and categories have been established to facilitate the case selection in this research.

First, according to Albert et al. (2017), NBS should meet the following criteria:

1. They should address a specific (impending) problem, by addressing benefits for society, economy and nature;
2. Use systems and processes from nature to provide services, by functioning as an umbrella term that encompasses engineering, economic and environmental planning experiences;
3. They should contribute to the sustainability transition through a gradual introduction, allowing time to enable assessments to the application in practice and possibly further adjustments and innovations;
4. Finally, they should be of sufficient scale to match the magnitude of disturbance (Andersson, Borgström & McPhearson, 2017).

Also, a categorization of NBS is made, based on multiple sources from scientific literature. For example, Xing et al. (2017) developed a simplified typology of NBS, specifically in and around buildings. Therefore, a literature review on urban green infrastructure was executed, by analyzing literature sources from multiple disciplines. These include for example health benefits related to nature, sustainable water management through the use of nature and job and investment opportunities provided by nature. This finally leads to four different NBS types: indoor plants, green roofs, green walls and green and blue landscaping.

Moreover, Branquinho et al. (2015) studied the concept of urban green space within existing literature, collecting elements of urban green space. All these elements were grouped into categories, through which a comprehensive typology of urban green space was created. This includes for example wetlands, horticulture, botanical gardens and atriums.

However, as the latter source is the broadest and most inclusive, it does not focus on the NBS and its criteria specifically. Therefore, in order to create a useful typology for this research, it is combined with the typologizing strategy by Xing et al., keeping into account the criteria that were formulated above. This eliminated possible categories that were too small (such as a house garden) or were not necessarily focused on solving any environmental, social or economic issues (such as a cemetery or a camping area). By combining criteria and characteristics from both literature sources, the following categories and sub-categories of NBS were identified and used by the NATURVATION project (2017) and will be used in this research as well:

1. External green on buildings;

Examples include green walls, green roofs and balcony greening.

2. Urban green areas connected to grey infrastructure;

Examples include alley and street green, railroad banks and tracks, house gardens, green playgrounds, institutional green space, green parking lots and riverbank greens.

3. Parks and (semi-)natural urban green areas;

Examples include urban parks or forests, pocket parks or neighborhood green space, botanical gardens and green corridors.

4. Allotments and community gardens;

Examples include allotments, community gardens and horticulture.

5. Green indoor areas;

Examples include indoor vertical greeneries and atriums.

6. Blue areas;

Examples include lakes or ponds, rivers, streams, canals or estuaries, delta's, sea coasts and wetlands, bogs, fens or marshes.

7. Green areas for water management;

Examples include rain gardens, swales or filter strips and sustainable urban drainage systems (NATURVATION, 2017).

However, some of the categories overlap with each other or are combined together in one NBS initiative. These initiatives will still be included in the research, but are categorized under both or all the applicable categories.

2.2. GOVERNING STRATEGIES

As mentioned before, the research in this thesis will apply the concept of Nature-based Solutions to top-down governing strategies, from the point of view of the government, often especially in the form of the municipality. Therefore, this paragraph aims to build a governing framework through which multiple levels of governing are identified, discussed and operationalized. These levels will include the possible roles a government can take on in urban climate protection, ranging from a full top down authoritarian role towards a more passive government role, which is expressed in bottom-up climate protection initiatives.

This framework is developed by means of two existing complementing theories: the modes of governing framework by Bulkeley and Kern (2005) and the theory of governance arrangements as proposed by Mees et al. (2012) and Skelcher (2008).

- First, the modes of governing framework by Bulkeley and Kern (2005) identified four different (rather top-down) governing strategies and practices through which climate protection is taking place locally.
- Secondly, the theory of governance arrangements by Mees et al. (2012) and Skelcher (2008) adds to the above theory, by placing these possible government roles into a hierarchical order. Moreover, as well as multiple more top-down roles and strategies, it also includes the other end of the spectrum, including bottom-up climate protection strategies. This more passive government role is relevant to include in this research, as it is an important aspect in the initiation and (eventually) mainstreaming of NBS, as market and society have the capability to play an important role in the mainstreaming process.

2.2.1. MODES OF GOVERNING

For the development of the modes of governing theory, Bulkeley and Kern (2005) researched the functioning of German and British local governments regarding their climate and environmental protection policies (i.e. waste, public transport and energy policies). By analyzing these policies and comparing their characteristics, four different modes of governing could be recognized. These include self-governing, governing by authority, governing by provision and governing through enabling.

Self-governing: This includes the government governing its own activities; introducing climate policies for itself, through which it tries to function as a role model for the rest of society. It depends largely on processes of internal organizational management (Bulkeley and Kern, 2005). This term should however not be confused with bottom-up governing strategies, as it may sound like markets or civil society governing themselves and their own projects and initiatives, rather than a government.

Example: In order to increase the number of green areas and aspects in a city or municipality, a local government can provide its own governmental buildings with green roofs and/or facades.

Governing by authority: Within this role, the government performs an authoritarian role towards society, including both market and civil society. It is a rather traditional mode of governing; it uses particular forms of authority, such as regulation, mainly characterized by the use of sanctions and standards (Bulkeley and Kern, 2005).

Example: A municipality can introduce a mandatory requirement for green roofs on newly built or renovated buildings. This specific policy was introduced by the municipality of Basel and has proven to be very successful (Mees et al., 2012).

Governing by provision: This is a more traditional mode of governing as well, through which the government is placed in the role of the provider, delivering direct forms of services and resources. However, this mode of governing is slowly losing its significance. It is achieved primarily through practical, material and infrastructural resources (Bulkeley and Kern, 2005).

Example: A municipality can provide its own maintenance service of greenery in the city, such as green roofs, parks and communal gardens.

Governing through enabling: This is likely to be a more upcoming mode of governing in local governments. It is characterized by partnerships between the local government and private- and voluntary-sector parties and increased engagement with the local community. The goal is to facilitate, co-ordinate and encourage through the use of persuasion, argument and incentives (Bulkeley and Kern, 2005).

Example: A city or municipality can set up subsidy systems for the construction of green roofs on buildings. At the same time, it can promote the awareness regarding the benefits of green roofs through campaigns and informative meetings.

A side note however is that the above four modes of governing are not self-contained; they often seem to overlap, not only within a local government as a whole, but combinations of multiple modes can also be recognized in individual measures, actions and policies (Kern & Alber, 2008). For example, a local government can introduce subsidies for citizens and private parties to build green roofs to increase the share of green roofs in the city or municipality, while at the same time, it makes sure all of the governmental buildings are provided/built with green roofs as well.

As already mentioned, the theory surrounding these four modes of governing is derived from the functioning of British and German local governments. The basic structure of these governments is similar to the Dutch; the (local) council is directly elected and the local governments have their own set roles and responsibilities in the field of climate change adaptation within society. Therefore, these four modes of governing should be applicable to the Dutch municipalities covered by this thesis as well; the Netherlands is a decentralized state, in which municipalities have many fixed responsibilities, including climate change adaptation and taking care of the urban natural environment (DPRA, 2018). However, as Bulkeley and Kern (2005) research climate adaptation strategies in different sectors of climate adaptation than NBS, these modes of governing would require some adjustments in order to be able to apply these to NBS.

2.2.2. GOVERNANCE ARRANGEMENTS

Governance arrangements can take place on a certain scale, ranging from a complete hierarchical top-down government strategy to complete self-government. According to Mees et al. (2012), various forms of governance can be recognized within these extremes. On the one hand, these can take on more hierarchical forms of cooperation between the three spheres of state, market and civil society (Lemos & Agrawal, 2006). These forms of governance are also referred to as hybrids. On the other hand, cooperation can also take on non-hierarchical forms, involving policy networks between public and private parties. These forms of governance are also referred to as interactive.

According to Mees et al. (2012) and Skelcher (2008), three governance arrangements can be recognized, from most hierarchical to least hierarchical: the hierarchical governance arrangement, the interactive governance arrangement and the market governance arrangement, in which governance is defined as *“a way of conceptualising the means of social coordination”*.

The hierarchical governance arrangement: The domination of this governance arrangement in environmental matters can be characterized and explained by multiple factors. First, especially climate change adaptation measures are often introduced based on the so-called precautionary principle that is part of a (local) government’s public responsibility, often established by law (Bourguignon, 2015). Hierarchical governance strategies are characterized by top-down interventions and policies, set up by public actors. Most of these interventions and policies are formed by regulations (Mees et al., 2012).

Example: Local authorities can feel responsible for increasing the number and share of green roofs in the municipality. Different components within this process can play a role within a local government’s strategy. These include agenda-setting, acquiring knowledge, policy-making and the formulation of specific objectives with regard to green roofs.

The interactive governance arrangement: Interactive governance strategies are mostly characterized by the use of networks between both public and private actors. The interventions and initiatives from these networks are therefore often a shared responsibility and are often brought about through dialogues, consultation and cooperation, where trust and exchange of resources form the basis of the relationship. An important additional factor, despite the required trust, is the openness and transparency of the actors and the policy process, in order to guarantee the accountability of all the actors involved (Mees et al., 2012).

Example: A local government can set up a policy or regulation for green roofs in the city/municipality. To practically facilitate this policy or regulation, the government can start partnerships with a private party, which could provide the required services and materials.

The market governance arrangement: This governance strategy comes closest to bottom-up self-governance. Within this governance arrangement, the private sector regulates itself, initiating its own responsibilities. However, in contrast to public considerations, private actors are mostly driven by profit and competition, which is often expressed in efficiency.

Example: In the field of NBS, private actors can self-regulate in multiple ways. For example, in the case of commercial private actors, they can choose to supply the materials for green roofs, or it can provide services, such as green roof maintenance. Moreover, there is the group of private property owners, which can install and/or finance NBS such as green roofs on their own properties (Mees et al., 2012).

A similar side note as in the previous paragraph can be stated here; evidence shows that certain policies and/or regulations cannot necessarily be categorized under one of these three governance arrangements. Regulations and/or policies could fall under multiple arrangements; certain parts of a policy could for example be categorized under the hierarchical governance arrangement, while other parts of the same policy could be categorized under the interactive governance arrangement.

2.2.3. COMBINING GOVERNING STRATEGIES

As mentioned in the introduction to this chapter, this paragraph aims to build a new suitable theory for this research, by using the governance arrangements theory by Mees et al. (2012) and Skelcher (2008) to apply a hierarchy to the more extensive theory of modes of governing by Bulkeley and Kern (2005). The most suitable governing strategies are identified from these theories, reformulated and ranked into a new framework, ranging from bottom-up towards top-down governing strategies. However, these modes of governing will not exactly be taken over in this research; a few adjustments have to be made first, in order to make them suit NBS governing especially. First, as mentioned before, governing by provision is a slightly outdated mode of governing. Especially for NBS it is probably not a highly common mode of governing, since NBS do not highly depend on intensive services and non-financial resources provided by the government. Therefore, this mode of governing is excluded from this research. Further adjustments are stated and elaborated throughout this paragraph. The combination of the two theories including the adjustments made to these theories lead to the following ranked framework of governing strategies that will be used for this research:

1. Starting at the bottom of the ladder, the arrangement of market governance (Mees et al., 2012; Skelcher, 2008) is most recognizable. It is characterized by high levels of self-initiation and lack of political involvement. However, as the name already might have given away, this governance arrangement focuses mainly on the market. Many NBS are very locally scaled, meaning that civil society is often directly involved as well. For this reason, market governance is stretched further for this research towards civil society and renamed as **'societal self-governance'**. For the (local) government, this implies a passive retracted governing strategy.

Such a governing strategy might be beneficial within NBS, as private actors in specific have the resources to invest in innovation and contracting, increasing the efficiency and thereby improving their performance.

Going up in the framework of governing strategies, the government slowly gets increasingly involved. According to Mees et al. (2012) and Skelcher (2008), this is referred to as interactive governance, which is especially recognizable in governing through enabling. However, this mode of governing will be adjusted to fit this research better. According to Bulkeley & Kern (2005), governing through enabling includes both a more direct and indirect involvement in the implementation of NBS or other climate adaptation/mitigation policy in society; on the one hand, governing through enabling is characterized by encouraging the implementation of NBS and provide the necessary resources to literally 'enable' the market and civil society in implementing NBS initiatives. On the other hand, the government can perform a more active and direct role, by coordinating and facilitating the implementation of NBS, in a close network with the market and/or civil society. From the perspective of the government, these are two distinct roles, in which the government can either take a more active or passive role in interacting with society for the implementation of NBS, and the government is either directly responsible or not. Therefore, as this research focuses specifically on

the roles and perspective from the government, these are taken apart and formulated as two separate governing strategies:

2. Therefore, the second level in the governing strategies framework will include the more passive form of governing through enabling, as the (local) government is less intensely involved. However, this more passive governing strategy will be formulated as **'governing through enabling'**, as it literally enables the market and civil society to implement NBS initiatives by providing information, land and / or financial resources. Within interactive governance, private and civilian actors have the most power and freedom through the governing strategy of governing through enabling. Through this mode of governing, the government can, in the case of NBS, steer the direction of climate change adaptation/mitigation measures, through argument and persuasion and (financial) policies. This governing strategy not only has an effect on the direct people and parties involved; the strategy of argument and persuasion can also have a more indirect effect on other actors, as they encourage each other to establish and join climate/green initiatives.
3. The third level in the governing strategies framework will then include the more active role of the government within the original mode of governing through enabling by Bulkeley & Kern (2005). This governing strategy will be referred to as **'governing through networks'**, as the (local) government uses intensive networks and partnerships to coordinate and facilitate the implementation of NBS. Within this governing strategy, responsibilities are shared among the different actors, all actors have their own functions and tasks and every actor provides some necessary resources (e.g. financial resources, human resources, knowledge and information).

Networks and partnerships can be very useful for (local) governments, as networks enable actors to use each other's specialties, while on the other hand responsibilities can be shared and tasks can be divided. This effect is reinforced in today's society because of the increase of individualization and specialization (Edelenbos & van Meerkkerk, 2016).

When going further up the governing strategies framework, initiatives are increasingly implemented through a more top-down approach, in which the government becomes the highest power. This is recognizable in the modes of governing of self-governing (not to be confused with societal self-governance as explained earlier) and governing by authority. However, before implementation in this framework for NBS governing, the mode of governing of self-governing also requires some adjustments; the theory by Bulkeley and Kern (2005) does not keep into account policies and measures implemented solely by a government stakeholder, simply because it is their responsibility to take protect and take care of citizens. For example, a municipality can build a park on derelict land, simply because it wants to improve the living environment of its citizens. Therefore, the mode of governing of self-governance will be expanded and reformulated in 'governing through responsibility':

4. Therefore, the fourth level in the NBS governing strategies framework will include governing through responsibility, in which the government executes and implements NBS measures largely without influence from the rest of society, in order to fulfill its duty to provide for a

safe and comfortable living environment of citizens, while often aiming to set the right example by implementing certain measures, in the hope that these measures will also be implemented voluntarily by the rest of society.

For a (local) government, this can be a useful mode of governing, as actions, measures and policies are relatively easy to execute; all of the necessary parts and phases are managed by the same organization, from the finance and administration, to the maintenance and monitoring of the project. Moreover, the executed climate measures and actions in combination with this method of self-organization have the capability to save money. Lastly, the local government taking action itself, partly functioning as a role model, helps to increase political support. However, the land and properties of the local government only accounts for a small amount of society's land and properties as a whole. Therefore, to be able to make a real change in society, self-governing has to be complemented by another mode of governing (Bulkeley and Kern, 2005; Kern & Alber, 2008).

5. The most top-down level of governing strategies is '**governing by authority**', which is a combined governing strategy from both the mode of governing by authority in the modes of governing theory (Bulkeley & Kern, 2005) and the hierarchical governance arrangement in the governance arrangements theory (Mees et al., 2012; Skelcher, 2008). In both cases, the government is the highest power, reducing the freedom of private and civil society actors. The government can steer the direction of climate change adaptation measures by setting up regulations and standards, which the rest of society must meet. Through sanctions and standards, local governments have the capability to make a significant difference in society, as local authorities can be more certain that actual influence will be exercised. However, this governing strategy is expected not be very common within NBS, as top-down imposed restrictions often cause the social acceptance of policies to be lower (Pereira & Przeworski, 1993). Moreover, authoritative policies are known to be less efficient due to the bureaucracy that is playing a significant role in (local) governments.

These five governing strategies form the framework for this thesis, as summarized and visually depicted in figure 2.2 below.

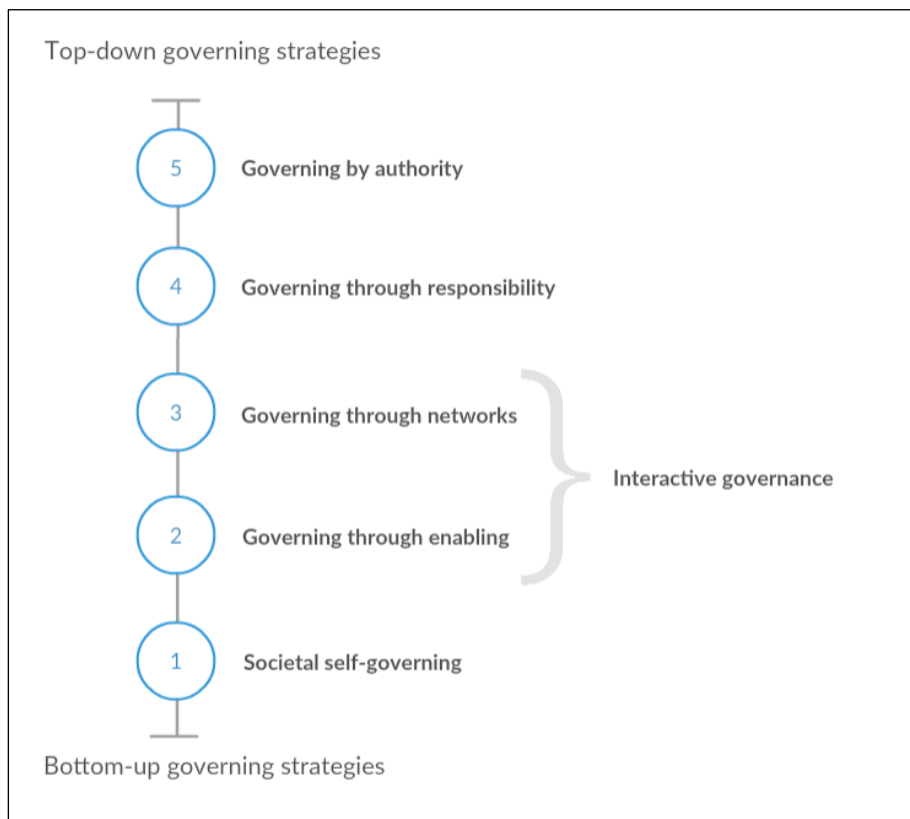


FIG. 2.2. LEVELS OF GOVERNING STRATEGIES; FROM BOTTOM-UP TO TOP-DOWN GOVERNING

The operationalization of the governing strategies within this framework will be elaborated in the Methodology chapter, as the operationalization will largely depend on the research methods and methods of analysis.

2.2.4. GOVERNING STRATEGIES INDICATORS

In order to identify the governing strategy for each of the researched NBS, it is necessary to formulate indicators that should be paid attention to during the NBS analyses.

First, there are a few more general questions that can be asked that already indicate the broad direction to a certain governing strategy:

1. Who or what are the **key stakeholders** within the NBS?

For example: if there are a large number of key stakeholders to be recognized within an NBS initiative, including the government, this could indicate a governing through networks strategy.

2. Who or what are the **key initiators** of the NBS?

For example: an initiative can be initiated by the market or civil society, possibly indicating a societal self-governance strategy. Also, an initiative can be initiated by the government, possible indicating a governing by example strategy.

3. Who or what are the **leaders** of the NBS initiative?
For example: an initiative can be led by the market or civil society, possibly indicating a societal self-governance or governing through enabling strategy.
4. **Mandatory** or **voluntary** establishment of the NBS?
For example: if an NBS is established mandatory, this could determine a governing by authority strategy. If an NBS is established voluntary, this could determine more bottom-up strategies, such as societal self-governance or governing through enabling.
5. Is the NBS a **response to government policy**?
For example, depending on the type of policy, a response to policy could indicate a governing by (mandatory) authority strategy or a (voluntary) governing through enabling strategy.
6. What are the **participatory methods** are recognized to involve citizens in the NBS?
Participatory methods can determine the extent to which civil society is involved within an NBS. For example: if there are no participatory methods recognized, this could indicate a governing by example strategy. If there are many different forms of participatory methods recognized, this could indicate a more bottom-up governing strategy, or a governing by authority strategy, in which the government is solely imposing regulations on civil society.

Through these questions, one can learn to what extent a government is involved in an NBS initiative. However, a governing strategy can never be determined by one single indicator; it always relies on a number of indicators that together determine the most clearly used governing strategy.

Moreover, the following indicators can be perceived in such a way that they can possibly determine specific governing strategies, strengthening the outcome of the above mentioned indicators.

1. The **motivation** for the NBS initiative;
In case the motivation for the NBS initiative regards government policy, this could indicate governing strategies such as governing by authority or governing through enabling.
2. The main and sub-**goals** of the NBS initiative;
In case the goals of the NBS initiative include an exemplary function for the rest of society, this could indicate a governing by example strategy.
3. The presence and characteristics of **city networks** or **regional partnerships**;
City networks or regional partnerships could indicate a governing through networks strategy, in case there is a clear division of tasks and responsibilities among the involved stakeholders.
4. Government **subsidies** or **investments** for NBS;
In case the NBS is either fully or partly financed through subsidies or investments by the government, this could indicate a governing through enabling strategy.
5. **The financiers** of the NBS;
Together with the previous indicator, in case the government is a financier of the NBS, either partly or fully, this could indicate a governing through enabling strategy.

6. **Provision of land** by the government.

Moreover, apart from financial resources, the government could also provide NBS initiatives with land, also indicating a governing through enabling strategy.

The fully detailed step-by-step plan for the analysis using these indicators can be found in Appendix A.

2.3. MAINSTREAMING

In contrast to Nature-Based Solutions, the concept of mainstreaming is not new. For multiple decades, the concept has been used primarily in development policy, aiming to place issues involving poverty and gender inequality on the political agenda. In recent years, the growing importance of increasingly intensive climate and environmental policy has led to the (worldwide) emergence of so-called climate / environmental mainstreaming, also referred to as Climate / Environmental Policy Integration (CPI / EPI) (Brouwer, Rayner & Huitema, 2013).

There is no uniform definition of the concept and process of mainstreaming with regard to climate and climate change; there does not seem to be a general consensus in the existing literature on the ultimate goal of climate mainstreaming nor its characteristics or requirements. However, both scientific and practical non-scientific articles do agree in the essence and importance of climate mainstreaming, that climate policy is ought to be given a central position in policy and the policy making process concerning the increasing threat of climate change on humans and nature. Accordingly, Berkhout et al. (2015: 949) define the concept of mainstreaming in the climate sector as:

“The inclusion of climate considerations in policy processes, improving the consistency among policy processes, and where necessary, giving priority to climate-related goals above others.”

Therefore, the ultimate goal of mainstreaming is to change the rules of the game, until the new innovative ideas and activities become the general consensus (Picciotto, 2002).

However, this generally accepted and used definition and objective does not automatically lead to a precise practical implementation. According to Olhoff and Schaer (2010), researchers and experts do not seem to agree on ways to operationalize, support and strengthen the concept and process of mainstreaming.

From these existing studies, it becomes clear how little knowledge and evidence there is about climate mainstreaming and its practical effects. In order to fill this knowledge gap, a literature review is executed in this paragraph, aiming to identify the different forms and criteria of mainstreaming policies. This will include literature related to climate / environmental mainstreaming, as well as CPI and EPI, as these concepts all refer to similar processes and are often used interchangeably in literature (Brouwer, Rayner & Huitema, 2013). The inclusion of these concepts will extend the availability of scientific literature surrounding this subject.

2.3.1 MAINSTREAMING CRITERIA

As mentioned before, although different criteria, characteristics and barriers for successful climate and environmental mainstreaming are widely discussed in literature, there is no widely accepted operationalization of the concept.

However, most researchers and practitioners do agree on one important factor determining the possible success of mainstreaming: **knowledge**. All involved practitioners and stakeholders should be provided with as much knowledge as possible, throughout the entire mainstreaming process. As the first, most basic step towards mainstreamed policy, all practitioners and stakeholders must be provided with a general knowledge and understanding of climate change and climate variability (CDEMA, 2011). This will lead to a high level of awareness and sense of urgency to place climate and environmental issues on the political agenda to be able to make a necessary change (Pervin et al., 2013; Runhaar et al., 2018; UNDP-UNEP, 2011). According to Brouwer, Rayner and Huitema (2010), the effect of this factor can be practically recognized in the Swedish political context, in which the knowledge and awareness of climate change and its consequences are relatively high. In this context, this ensures that mainstreaming is often a self-evident result. Moreover, the actors behind these successfully mainstreamed policies can function as a stimulus, resource and expertise for other policymakers around the world (FAO, 2009). Also, larger scale (political) institutions such as the European Union can provide knowledge and information about the practical designs and implementation techniques for successful policy measures (Faivre et al., 2017).

Especially with regard to climate change policies, it is important for policymakers to be provided with scientific information and advice, because of the uncertainty of the topic and its constant developments. Knowledge and awareness regarding these developments and their accompanying consequences can positively influence climate mainstreaming, resulting in iterative policy responses (Pervin et al., 2013).

In the actual policymaking process, knowledge is still an important factor, since climate and environmental measures (such as NBS) often require innovative techniques. These techniques themselves, including their effects are often not widely known among policymakers. Also, climate and environmental issues are embedded in all aspects of society. Therefore, the mainstreaming process depends on advanced technical knowledge and carefully thought-out strategies, including socio-economic background information (Guzman, 2016). Accordingly, policymakers have the best chance of identifying and implementing the most suitable policy measures (CDEMA, 2011).

Finally, the execution stage of climate and environmental policy largely depend on knowledge, gained through monitoring and evaluation of the policymaking process and outcomes (Adelle & Russel, 2013; Wamsler et al., 2017). According to Kivimaa & Mickwitz (2006), evaluating the policymaking process helps to gain knowledge about the distribution of responsibilities and the allocation of resources. Also, evaluating and monitoring the policy outcomes can help gain knowledge about the functioning of the implemented measures. This can be used both as feedback to improve the functioning of these measures and also to improve the learning process about climate and environmental policymaking in general; this helps guarantee mainstreamed policies on

the long term and gain new knowledge for other future policies and mainstreaming elsewhere by sharing the knowledge with other actors in the policy network (Runhaar et al., 2018).

This leads to the second criterion determining successful mainstreaming: **the policy network**. Networks in policymaking can have multiple benefits in mainstreaming policies, including the ability to share and gain knowledge from other stakeholders. According to Rosenbloom (2016) and Veenman (2018), networks are key in this process; actors from different fields and sectors all have their own stories and visions, which are shared through this networking process. Different stakeholders help each other learn about environmental issues and their consequences, which eventually leads to actual changes in policies and policymaking (Adelle & Russel, 2013). Also, network policies can benefit from other resources (besides knowledge) provided by the multiple stakeholders, as well as the ability to distribute and / or share responsibilities among these stakeholders (Brouwer, Rayner & Huitema, 2013; Uittenbroek, Janssen-Jansen & Runhaar, 2013).

These policy networks can be characterized as both intra- and inter-organizational. Both forms come with their own set of benefits. First, intra-organizational policy networks imply that coordination and cooperation can take place between government departments. These networks can be subdivided into horizontal and vertical governance networks (Runhaar et al., 2018):

1. On the one hand, horizontal governance networks can include government departments from other policy sectors (Guzman, 2016). These networks can be beneficial in mainstreaming climate and environmental policies, as these often cover multiple socio-economic aspects of society, falling under multiple policy sectors. On the other hand, horizontal governance networks can include government departments from other municipalities or provinces (Jänicke, 2015), in order to learn from each other and possibly increase the spatial scale of policies.
2. Vertical governance networks include government sectors from different operating levels (Guzman, 2016; Jänicke, 2015). Through coordination and cooperation with different government levels, the vulnerability of the lower government levels (such as municipalities) can be reduced, and the policy effects can help to be guaranteed on the long term through the involvement of national and global government actors, which generally tend to be more stable (Guzman, 2016).

Secondly, inter-organizational networks imply cooperation and coordination with external organizations, such as non-governmental organizations, citizens and private organizations (i.e. planners and financiers) (Runhaar et al., 2018; UNDP-UNEP, 2011). These networks can promote mainstreaming through the provision of external (possibly foreign) stimuli, external resources and expertise (FAO, 2009; Wamsler et al., 2017). Also, tasks and responsibilities can be shared among a larger group of stakeholders (Guzman, 2016), increasing the resilience of a certain policy.

This importance for climate-resilient policies leads to the third criterion for mainstreamed environmental and climate policies: a central position for environmental issues and climate change in **government objectives and goals** (Adelle & Russel, 2013; Brouwer, Rayner & Huitema, 2013; CDEMA, 2011; Guzman, 2016). By applying a so-called 'climate-first approach' in policymaking,

climate- and environmentally resilient policies are easier identified and implemented (Pervin et al., 2013).

In many governments, both local and national, policy areas and their interests and demands vary highly, often causing a relatively low priority regarding climate and environmental objectives (Adelle & Russel, 2013; FAO, 2009). Accordingly, Gupta and van der Gijp argue that mainstreaming *“is a political and ideological concept that moves climate change from a marginal discourse and puts it in the centre of discussion to redesign other issues (...)”* (2014: 79). This applies to all government sectors, as the environment is an *“economywide issue”* (UNDP-UNEP, 2011: 12). Moreover, the centralizing of environment and climate policies is an important factor within the mainstreaming process, as other demands and interests can possibly conflict with environment and climate policies, diminishing the level of commitment to these policies (Runhaar et al., 2018).

The central position of environment and climate issues can be recognized through the formulation of policy objectives and the way these issues are reflected and referred to in policy documents and subsequent measures and / or legislation (Pervin et al., 2013; Runhaar et al., 2018; Uittenbroek, Janssen-Jansen & Runhaar, 2013).

The fourth criterion that is identified as a success factor for environment and climate mainstreaming also derives from the policy networks: **bottom-up citizen involvement** (FAO, 2009; Wamsler et al., 2017). Involving citizens into the policymaking process increases their awareness and knowledge as well. This helps policy implementation and mainstreaming on the long term, as increased awareness among citizens increases the support for environment and climate policy (Runhaar et al., 2018). Also, citizens are aware of the local conditions; their involvement can maximize the effectiveness of policies, as the environment and climate change impacts show at the local level and the marginalized part of the population is often most affected (UNDP-UNEP, 2011; Wamsler & Pauleit, 2016).

The ultimate goal is the inter-institutional level, in which both top-down (vertical) and bottom-up (horizontal) efforts come together, in which one *“holistic and distributed governance system for climate adaptation”* (Wamsler et al., 2017: 263) is achieved.

This holistic and distributed governance system also means that mainstreamed policies can be recognized among a large **time and spatial scale**. This is also the fifth and final criterion for mainstreamed environment and climate policies to be recognizable in existing literature. First, in order to mainstream environmental and climate issues especially, measures and policies require a long-term strategic perspective (Aleksandrova, 2019; Wamsler & Pauleit, 2016). Formulating long-term objectives helps to ground necessary measures in policies (Guzman, 2016). Also, as the consequences of climate change keep changing over time, integration of both short-, medium- and long-term policy is necessary, as decisions need to be taken continuously at the right times. According to Pervin et al. (2013), environment and climate change measures therefore require an iterative planning; one-off stand-alone, often project-based, measures have failed to respond to the different climate change consequences showing over time.

Moreover, mainstreamed environment and climate policy requires an implementation at a larger spatial scale as well. This could mean that projects, measures and / or regulations are:

1. Extended and implemented in other similar contexts and execution elsewhere;
2. Implemented in similar contexts elsewhere, but executed on a larger area or as a more intensive project or measure;
3. Implemented in a different context, such as from an urban to a rural context, or the other way around (Aleksandrova, 2019).

Specifically, this means that projects, measures and / or regulations are implemented into existing programs and plans, in which the ultimate goal is to achieve implementation in policies from higher (national) government levels (Runhaar et al., 2018), as already elaborated in the second 'policy network' criterion.

In short, according to existing literature, the following five criteria regarding successful environment and climate mainstreaming in policy could be identified:

1. Knowledge;
2. The policy network;
3. Central objectives and goals;
4. Bottom-up citizen involvement and
5. A large time and spatial scale.

2.3.2. MAINSTREAMING INDICATORS

In order to recognize the mainstreaming criteria for each of the researched NBS, it is necessary to formulate indicators that should be paid attention to during the NBS analyses. Therefore, each mainstreaming criterion will have its own indicators.

First, knowledge can be determined by the following indicators:

1. Presence of measuring indicators for the achievement of goals;
2. Presence of research projects;
3. Provision of knowledge resources in an NBS initiative and
4. Presence of monitoring and evaluation systems.

Second, the presence of a policy network can be determined by the following indicators:

1. Number of types of key stakeholders involved in an NBS initiative;
2. Types of key stakeholders involved in an NBS initiative: do these indicate an intra- or interorganizational network?
3. Presence of a city network and / or regional partnerships.

Networks in mainstreaming are different from the governing through networks strategy, as governing through networks deals mostly with the qualitative characteristics of a network, making sure that the government is working together with other stakeholders from both or either civil society and / or the market. For networks in mainstreaming, this is not necessarily the case; mainstreaming is mostly determined by quantitative characteristics, such as the amount of

stakeholders involved in a network, whether this solely includes government stakeholders, or also includes market and / or civil society.

Third, the central objectives and goals of a certain NBS initiative can be determined by the following indicators:

1. The main and sub-goals of the NBS initiative: are the NBS and its benefits a central goal?
2. Presence of a city-level NBS vision/plan/strategy in connection to the project;
3. The extent to which the formulated goals are considered to be achieved.

Then, the bottom-up citizen involvement within NBS initiatives can be determined by the following indicators:

1. Citizens involved as a key stakeholder;
2. Citizen involvement in planning the NBS;
3. Citizen involvement in decision-making regarding the NBS;
4. Citizen involvement in NBS management;
5. Citizen leadership of the NBS.

These indicators have been derived from the participation ladder by Arnstein (1969). According to the participation ladder, citizens have most power when they are in control and in charge of policy and managerial aspects, such as planning, decision-making and management.

Last, the time and spatial scale of an NBS are determined by the following indicators:

1. Number of beneficiaries from the NBS;
2. Planned end year of the NBS;
3. Spatial scale of the NBS (e.g. street level, neighborhood level, urban level);
4. Replicability of the NBS.

The analysis of the mainstreaming criteria using these indicators will be executed by scoring each indicator for each NBS initiative (ranging from 1 to 5). The final score for each mainstreaming criterion will then be determined by the average weight of these indicator's scores. In Appendix B, the fully detailed scoring per indicator will be elaborated.

2.4. CONCEPTUAL FRAMEWORK

This chapter had established that an NBS meets its criteria when it addresses a specific (imminent) problem through implementation at such a large scale that it is capable of making a difference, while at the same time applying environmental, economic and engineering expertise, so that a contribution can be made to gradual innovation and the sustainability transition. Subsequently, this chapter looked into the suitable governing strategies to get these NBS off the ground, for which bottom-up and top-down as well as interactive policy strategies appear to be possible. However, in order to ensure the implementation and presence of NBS on the long term, it is important that NBS are mainstreamed. In other words, they require to be integrated into policy. According to the third paragraph, this mainstreaming process is boosted by five different factors. First, it is important that

enough resources are provided, especially in the form of knowledge. Secondly, the types and amount of stakeholders involved is an important criterion, in which each stakeholder has its own clear responsibility and especially citizens are given a high level of input as well. Lastly, an NBS requires extensive formal planning, with special attention to the formulation of goals and objectives and a long term time and large scale spatial planning. Each of the governing strategies is likely to score differently on each of these factors and criteria.

These above identified and developed theoretical frameworks can be combined and summarized into one simplified conceptual model, as shown on figure 2.3 below. The goal is to determine to what extent the different (local) governing strategies influence the mainstreaming of different types of NBS.

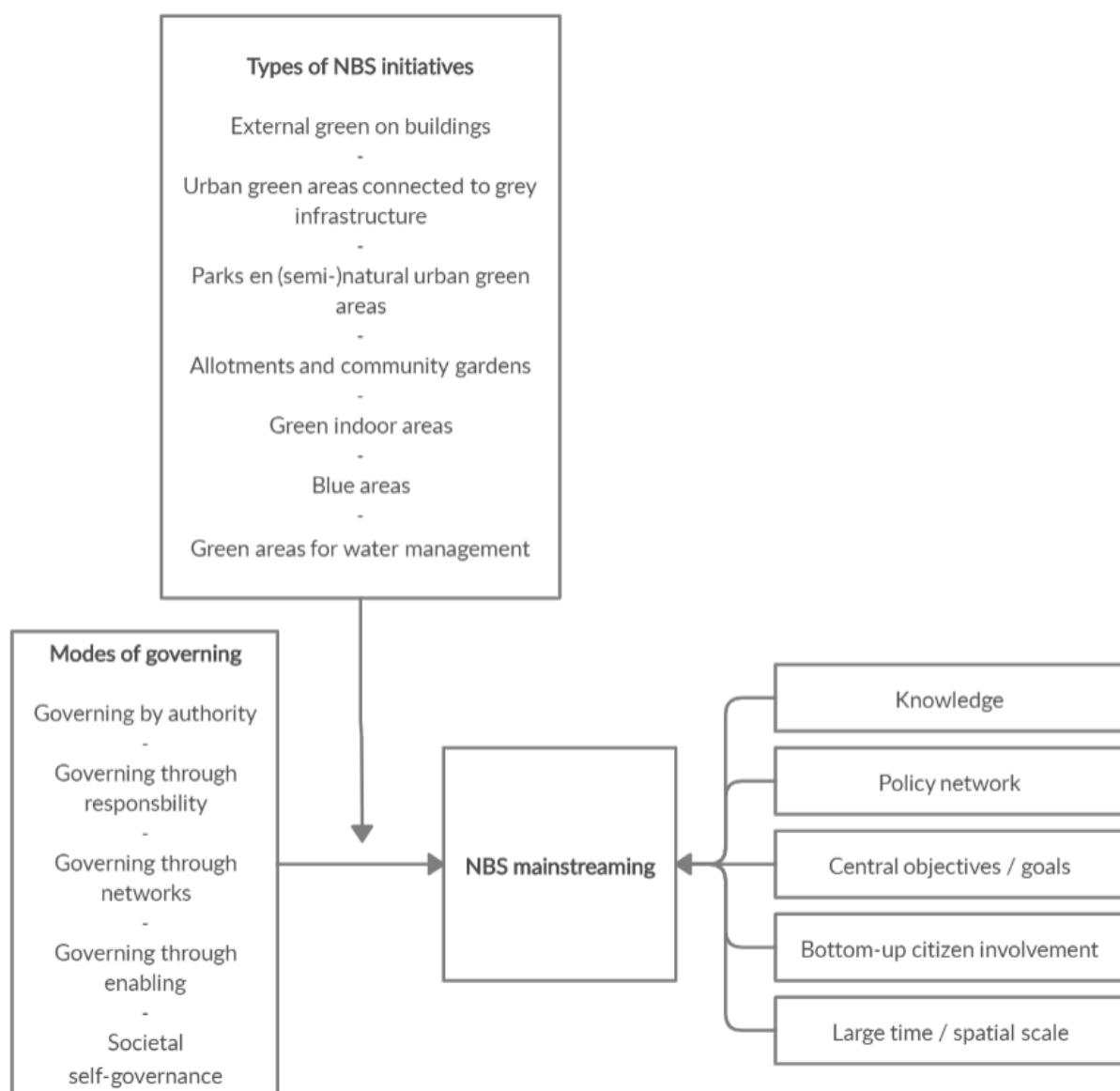


Fig. 2.3. Conceptual framework

3. METHODOLOGY

This chapter elaborates the methodology behind this research. All steps are followed to describe and explain the different methodological choices within the conduction of this research. First, paragraph 3.1 starts by positioning this research within the range of research approaches and philosophies. Subsequently, paragraph 3.2 discusses the research design, methods and the justification of both the validity and reliability of the research. Paragraph 3.3 then describes and justifies the research material and methods and steps regarding the collection of this research material. Finally, the methods of data analysis throughout the entire research process are being described in paragraph 3.4.

3.1. RESEARCH APPROACH AND PHILOSOPHY

The relationship between theory and research can be distinguished between two different approaches: the inductive and the deductive approach. A research with a deductive approach is generally guided by theory. In other words, a deductive approach starts with a theory, through which hypotheses can be formulated and tested, after which the hypotheses can either be confirmed or rejected. However, in the field of NBS, a deductive research would be difficult, because of the novelty of the concept, and the causing lack of existing research and theories. In contrast, a research with an inductive approach works the other way around; one starts with observations of which the results are then combined and analyzed to look for certain patterns, through which a new theory can be developed (Bryman, 2012; Vennix, 2012). The research in this thesis is executed through a more inductive research approach; it starts with extensively analyzed data and observations of nature-based solutions, through which underlying governing strategies and the status of mainstreaming can be traced. The results of these concepts are then analyzed and correlated, in order to find patterns and associations, with the goal of formulating a new theory. This corresponds step by step to the inductive research approach.

When a researcher follows one of these two approaches, he or she should get to the truth about the subject being investigated. However, this truth is not self-evident; it is formed by what is believed about the world and the environment by which one is surrounded. In other words, the results of an investigation are determined by certain visions of truth (also referred to as ontology) and the way in which this truth is obtained (also referred to as epistemology) (Sekaran & Bougie, 2013). It is important for a researcher to realize and keep into account this disputable truth, because the nature and existence of research objects are not always certain. In addition, ontology and epistemology help the researcher learn how the obtained knowledge and truth is structured, and how this should be reused and represented (Chandrasekaran, Josephson & Benjamins, 1999).

This research is shaped mostly by the postpositivist research philosophy. The postpositivist research philosophy implies that science and scientific research is the way to get to the truth. It aims to find associations and relations between the researched variables through the use of a priori theories. This is also recognizable in this specific research, because of these a priori theories and formulation of predetermined indicators and hypotheses (White & Marsh, 2006). Especially in the case of this research, postpositivism is better suited than positivism, because postpositivist keep into account

the probability of certain relations and causes and effects, rather than strict cause and effect (Creswell, 2013). This is an important consideration taking into account the predetermined research method, which will be further elaborated in the next paragraph.

3.2. RESEARCH DESIGN

This research is executed in cooperation with the Netherlands Environmental Assessment Agency (NEAA). The goal of the NEAA regarding this subject was to make a Dutch version of the 'NATURVATION' database. This is a European database consisting of 1000 Nature-Based Solutions spread over 100 cities in 24 European countries, put together by a team of researchers and students from all over Europe.

Both the European and the Dutch database as the final products were aimed to be set up in the same way and contain the same information, so that comparative analyses can be performed. Therefore, a selection of NBS spread over a selection of Dutch municipalities was made, based on a cross-sectional research design. According to Bryman (2012), a cross-sectional research design has multiple elements, which are all recognizable in the research in this thesis:

1. A cross-sectional research **represents multiple cases**; Researchers using this type of research design are often looking for variations between multiple research objects. This is shown in this particular research through the selection of multiple cases, in the form of NBS and municipalities, with the purpose of recognizing similarities and variations between the researched NBS and municipalities.
2. The research **reflects a single point in time**; all data is obtained at about the same time. This research functions as a snapshot or status-quo of the representation and functioning of NBS in the Netherlands. Thus, it looks back on the underlying governing processes and it determines which types of mainstreaming categories have been met.
3. The obtained data is either **quantitative or quantifiable**; this is an important requirement in cross-sectional research design to guarantee the recognition and analyzability of the variations between the selected cases. Data obtained through quantitative research methods is generally more consistent, which can also be seen in this research; it makes use of quantitative research methods through surveys containing both open and closed answers and a quantifiable research method of content analysis, through which each case is asked the same question repeatedly.

This cross-sectional research design specifically is exploratory in nature. As the subject of NBS is relatively new, no extensive research has been executed before. Therefore, a more exploratory research is required first. In this research, this exploratory nature is reflected in the broad scope and purposive data collection. The goal is to gain familiarity with the subject and its context and characteristics, by describing and understanding: what characteristics and contextual factors are most relevant in order to achieve certain goals, such as mainstreaming? This lacking knowledge and understanding about the subject in general also makes it difficult to formulate any hypotheses beforehand; there are no existing theories on which possible hypotheses can be based. Instead,

through exploration, this research aims to build new theories regarding NBS. Therefore, associations and relations are aimed to be made between the different types of NBS, governing strategies and mainstreaming indicators; an NBS can meet certain categories of mainstreaming, and also show a certain mode of governing through which the initiative is set up and maintained. However, cross-sectional / exploratory research designs such as this one cannot prove any causation, because all data are retrieved at one point in time (Bryman, 2012; Omair, 2015). Instead, patterns are being detected to formulate possible relations and associations.

3.2.1. RESEARCH METHODS

This research involves a large number of cases, often with large numbers of actors involved and about which many different types of text sources exist, with different perspectives and target groups. This requires a data collection method that is flexible, fast, and consistent and also guarantees the objectivity of the research.

Therefore, a large part of the data in this research will be collected through the method of content analysis. Due to the flexible nature of a content analysis, it can be applied to a wide variety of textual information. The researcher is also not dependent on people/actors behind NBS initiatives that are difficult to approach, such as governments or (large) companies (Bryman, 2016). A content analysis is *"an observational research method that is used to systematically evaluate the symbolic content of all forms of recorded communications."* (Kolbe & Burnett, 1991, pp. 243). Through content analysis, a researcher is enabled to objectively analyze and systematically recognize and identify the features of textual information (Sekaran & Bougie, 2013). This objectivity and systematics are guaranteed through predetermined categories and indicators to which the textual features can be assigned. Thus, the personal bias of the researcher is suppressed as much as possible and the textual analysis can be performed through a fast and consistent procedure (Bryman, 2012). Moreover, the data collection is being executed by multiple people, forming a risk for the consistency of the research. Therefore, content analysis can be useful through the iterative process of data collection on the one hand, in which the same task is executed over and over in a systematic, repetitive and recursive manner (Mills, Durepos & Wiebe, 2010). On the other hand, the use of fixed categories and indicators enables the researcher to maintain consistent and find certain patterns and common motives and stories. For this research, this more qualitative method of content analysis is applied to online secondary information sources. These include project reports and documents, websites, news articles, blog posts, etc.

However, as content analyses depend on secondary information sources, this research requires an alternative data collection method as well. Dutch NBS initiatives are often small-scaled and initiated or lead by relatively small municipalities and/or organizations. Therefore, initiatives are often not widely documented. For example, for a small community garden in a neighborhood in the municipality of Almelo, it will not be very likely to have extensive online information about the project and its associated processes. Therefore, the more profound data is collected through the use of questionnaires. These questionnaires do not only fill in the gaps where any online information is missing, it also provides more contextual information, which content analyses often disregard (Devi, 2009). This information is relevant for this research, since the research focuses on the roles NBS play

within a certain context. Moreover, the research is looking for patterns within and between certain NBS and their context, especially regarding the detailed motives of the involved actors. In this research, the questionnaires specifically include the governing processes behind a certain initiative and its mainstreaming characteristics. The original version of this questionnaire is found in appendix C. Through quantitative research, one is able to get a clear overview of and gain knowledge and understanding about the occurrence and characteristics of NBS throughout the Netherlands (Allen, 2017).

It has to be noted however, that although the European and the Dutch database are aimed to be similar, the data collection methods differ from each other. The European data was collected by using a research method similar to content analysis solely. For the Dutch data, this method is combined with quantitative data through the use of questionnaires. This thesis will therefore apply a mixed methods approach by combining both (quantifiable) qualitative and quantitative research methods through a cross-sectional research.

3.2.2. VALIDITY AND RELIABILITY

First, validity can be divided into both internal and external validity. In this case, internal validity deals with the extent to which one can be sure that an independent variable is responsible for or causing the dependent variable. External validity involves the extent to which the outcomes of a research can be generalized and applied beyond the research context (Bryman, 2012). Since this thesis is based on a cross-sectional research design, the internal validity is at risk; as mentioned before, it is not possible to draw causal relations and conclusions from cross-sectional research designs. Only so-called patterns of associations can be detected from cross-sectional research designs (Bryman, 2012). Therefore, especially to improve internal validity, multiple research methods are being applied; content analysis is compared and complemented with quantitative surveys. Anywhere possible, the survey will provide open answer possibilities to stay open to more location-specific or unexpected answers. The survey will be prepared to suit all respondents belonging to all sorts of NBS, both through the prepared questions and answer options as well as the intended simplicity of the questionnaire itself. The external validity is additionally improved by trying to include a variety of different types of NBS, so they form a good representation of the occurrence of NBS throughout the Netherlands. However, the research will never be completely generalizable, since the small municipalities in the Netherlands are excluded from the research for practical reasons, to be further elaborated in the following paragraph.

Secondly, the reliability of a research involves the extent to which a research can be repeated (Bryman, 2012). In order to improve the reliability of this research and thesis, the sampling size needs to be large enough in relation to the size of the population. In the case of this research, the population size is unknown. Moreover, not all types of NBS are documented as well as others. Especially smaller scaled privately owned (specifically in the form of green indoor areas) are not as well documented as others. Therefore, the sampling size is aimed to be as large as possible, to try and ensure the representation of all types of NBS, governed through multiple different strategies. Also, the complicated concepts are operationalized into multiple indicators, variables and survey

questions with the goal to represent the concept as it is meant to be interpreted clearly for all of the respondents involved.

3.3. PROCESS OF DATA COLLECTION

As mentioned before, this research was commissioned by the NEAA (Netherlands Environmental Assessment Agency). Their goal was to conduct a similar research as previously executed by the European Union's NATURVATION (NATure-based URban InnoVATION) project. Within this research, an extensive database was developed to get an idea of the current state of NBS in large European cities. A similar database was subsequently created for the NEAA to get an idea of the current state and the occurrence of NBS in Dutch municipalities. These two databases can then be compared with each other to see to what extent the Netherlands is either leading the way or running behind in the occurrence of NBS and to what extent certain characteristics differ from those of other NBS in Europe. Moreover, the research in this thesis is also based on this Dutch NBS database.

Originally, the goal was to research the largest possible number of NBS, with the largest varieties as possible. This was planned to be guaranteed by selecting 50 municipalities that differed from each other as much as possible on multiple demographic factors. However, this also causes for a large number of municipalities to be so small that NBS hardly occur here and / or are hardly documented online. Therefore, it was decided to research NBS within the 50 largest municipalities in the Netherlands instead, assuming that NBS located in these municipalities are documented better. Moreover, this lack of documentation had also influenced the method of data collection; within the NATURVATION project, all data in the database was collected by a team of researchers who performed a full content analysis of policy documents and websites of and surrounding the researched NBS. The same method was originally planned for the Dutch database as well. However, as NBS in smaller Dutch municipalities are not as well documented as NBS in large European cities, a different data collection method had to be found. Therefore, a content analysis for this Dutch research was combined with a survey that was sent to all project leaders and / or initiators of the researched NBS. Moreover, a few Dutch NBS had already been analyzed within the European NATURVATION project, which are also adopted in the database for this research.

All the data that was retrieved with both research methods and the NATURVATION project were then merged into one large database.

However, although the data used in this research is retrieved on behalf of the NEAA, the data analysis for this research specifically is executed separate from the NEAA. In addition, parts of the database have especially been added to benefit this research.

3.3.1. RESEARCH MATERIAL

This research consists of NBS initiatives from 50 Dutch municipalities. 500 of these initiatives have been approached to fill in a survey. Therefore, multiple selection procedures had to be executed.

1. **50 out of 355 Dutch municipalities.** First, the 50 municipalities are selected through purposive sampling; the cases are strategically selected based on their overall

representativeness (Bryman, 2012; Creswell, 2013). Ideally, municipalities would be selected through geographic distribution and through maximum variation of demographic characteristics. However, since this also includes very small cases, which have proven to generally not have enough information about initiatives taking place in their municipalities, this sampling method is not possible to execute with the available resources and research methods. Therefore, the selected case simply includes the 50 largest municipalities in terms of their number of inhabitants.

2. **500 NBS initiatives.** Secondly, about 500 initiatives are selected within the 50 municipalities; sampling based on maximum variation is applied in order to get an overall image for the Netherlands as a whole. This variation will be based on the categories of types of NBS that have been proposed in the theory chapter; each category of NBS must be equally represented in every researched municipality. Moreover, to keep in mind the geographical representation of the municipalities and the NBS in the Netherlands, the numbers of identified cases for each municipality will keep into account the geographical scale of these municipalities. In other words, the larger a municipality, the larger the number of NBS initiatives to be researched.
3. **1 Survey respondent.** Since the survey for this research contains rather specific and detailed questions about an NBS, it is important to target respondents that are highly knowledgeable, in order to get the most useful and reliable information. Therefore, possible respondents for the questionnaires are selected through the sampling type of intensity; this sampling method includes cases or respondents that are *“information-rich”* and *“that manifest the phenomenon intensely.”* (Creswell, 2013).

However, seven municipalities have been omitted along the way, because of a lack of response or NBS availability. Out of the exactly 494 identified NBS initiatives, 169 are included in the actual research analysis, due to a response rate of 34.2%. Together with the 30 NBS analyzed within the NATURVATION project, this adds to a total of 199 NBS involved in this research. Appendix D shows the response for each municipality involved in this research.

3.4. RESEARCH ANALYSIS

After conducting the surveys for each NBS and collecting the available associated documents, all data is combined and documented in a pre-defined Microsoft Excel framework for data analysis. The most appropriate and suitable method for this analysis is a quantitative content analysis. As mentioned before, this part of the research is executed separate from the NEAA.

3.4.1. QUANTITATIVE CONTENT ANALYSIS

Content analysis involves a scientific method for data analysis in which every possible form of text can be analyzed in a systematic and replicable manner (Bryman, 2012; Rose, Spinks & Canhoto, 2015). In the case of this research, content analysis is applied to survey responses and online documents, including news reports, websites and policy documents. Specifically, a quantitative

content analysis is performed, in which the goal is to recognize parts of the text and to be able to classify them. This classification is made on the basis of predetermined categories, which are then operationalized in a coding scheme, as elaborated earlier in the theoretical framework.

A content analysis knows multiple forms and can be subdivided into different types:

5. **Manifest** versus **latent** content: These refer to the type of textual content the analysis focuses on. Manifest content refers to the actual visible and countable text. In contrast, latent content refers to the underlying, possibly symbolic, meaning and concept behind manifest content (Rose, Spinks & Canhoto, 2015). This research focuses mainly on the manifest content of text; with the use of predetermined concepts and coding schemes, the goal is to stay close to the text and make use of the actual words and descriptions.
6. **Substantive** versus **formal** text features: Content analysis can either research substantive or formal text features, in which substantive text features refer to 'what' is being said, in contrast to 'how' something is being said, referred to as formal text features (Schreier, 2012). Since this research focuses on the real content of text, regarding motivations, descriptions and underlying ideas, this research focuses specifically on the substantive text features.
7. **Conceptual** versus **relational** analysis: The actual execution of a concept analysis can be performed in two ways. Through a conceptual analysis, text and research objects are categorized through the existence and frequency of a certain concept, such as words, themes or characters. A relational analysis goes beyond this method, by searching and examining relations between the different concepts (Sekaran & Bougie, 2013). The latter is applied in this research, since the goal of this research is to find associations and relations between certain forms of NBS, their underlying governing strategies and the possibly accompanying forms of mainstreaming. This process will be further elaborated in the following paragraph.

A fully quantitative method by means of statistics was considered and tried, but is not possible for this research, due to the uniqueness of the NBS studied. This makes content analysis more applicable because of its highly flexible nature; it can be applied to a wide variety of media and theoretical approaches (Bryman, 2012; Utt & Short, 2018) and view data with a more open mind, whereby information is not immediately classified as numerical value.

3.4.2. PROCESS OF RELATIONAL ANALYSIS

In order to get a more thorough insight into how the content of the dataset is used for identifying and examining the possible associations and relations, the taken steps are described below.

1. The analysis of the data in this research consisted of two phases. First, the retrieved data from the content analyses and surveys were analyzed by using the pre-developed operationalizations in order to identify the types of NBS, underlying governing strategies and mainstreaming scores. This step was required, as many of the survey questions were

formulated as open questions, which cannot be used for quantitative relational analysis in this form. Therefore, each NBS was individually analyzed manually. This first step of the process created a new database with quantified data, suitable for quantitative relational analysis.

2. The second phase includes the quantitative data analysis with the newly created database. All in order to get a clear idea of the researched NBS and get familiar with their characteristics and context, the types of NBS are analyzed through frequency tables and graphs.
3. Next, by using the same data, the governing strategies are connected to all of the research NBS, to draw some first conclusions about the occurrence of certain underlying governing strategies with certain types of NBS. This is determined through the use of statistical Chi-square tests of independence (χ^2). A Chi-square test of independence tests the (in)dependence of two (or more) categorical variables. Also a Phi test is executed, which calculates the strength of a relation, by also keeping into account the sample size, while also showing whether the relationship is positive or negative. These tests are performed separately for all different combinations of governing strategies and types of NBS.
4. The following step includes the other side of the theoretical framework, concerning the criteria of mainstreaming connected to the types of NBS. Statistical tests are performed to check if the difference in mainstreaming scores between the types of NBS is large enough to be significant and if there are possibly more significant relationships, by doing an in-depth research among all NBS types. Therefore, a Mann-Whitney U Test is executed to determine whether the mainstreaming criteria are generally met for each different type of NBS.
5. The last step will connect the mainstreaming scores to the governing strategies, by using a Mann-Whitney U-test as well. Together with the different types of NBS, this will create one overall image of all concepts and their relations between them. This will then be visualized in a table with all values of significance, in which governing strategies, subdivided among the types of NBS, are opposed to the mainstreaming categories.

4. RESULTS

This chapter will present the results of the data analysis regarding the NBS initiatives. The possible relations between the different variables will be investigated and elaborated step by step, by following the sub-questions of this research.

However, before being able to answer these sub-questions, a content analysis had to be executed first to determine the specific governing strategies and mainstreaming characteristics from the raw data. The new data from the content analysis will be analyzed thoroughly, for which different methods of analysis will be used for the different relational analyses, after which the earlier formulated hypotheses will either be accepted or rejected. Together, these steps aim to identify what (local) governing strategies are most suitable for the mainstreaming of which types of Nature-Based Solutions.

4.1. GOVERNING STRATEGIES FOR NATURE-BASED SOLUTIONS

This paragraph aims to search for possible relations between the types of NBS that were identified and researched on the one hand, and the governing strategies used on the other hand. In this case, the NBS types are the independent variable and the governing strategies are forming the dependent outcome variable.

4.1.1. EXPLORING GOVERNING STRATEGIES AND TYPES OF NBS

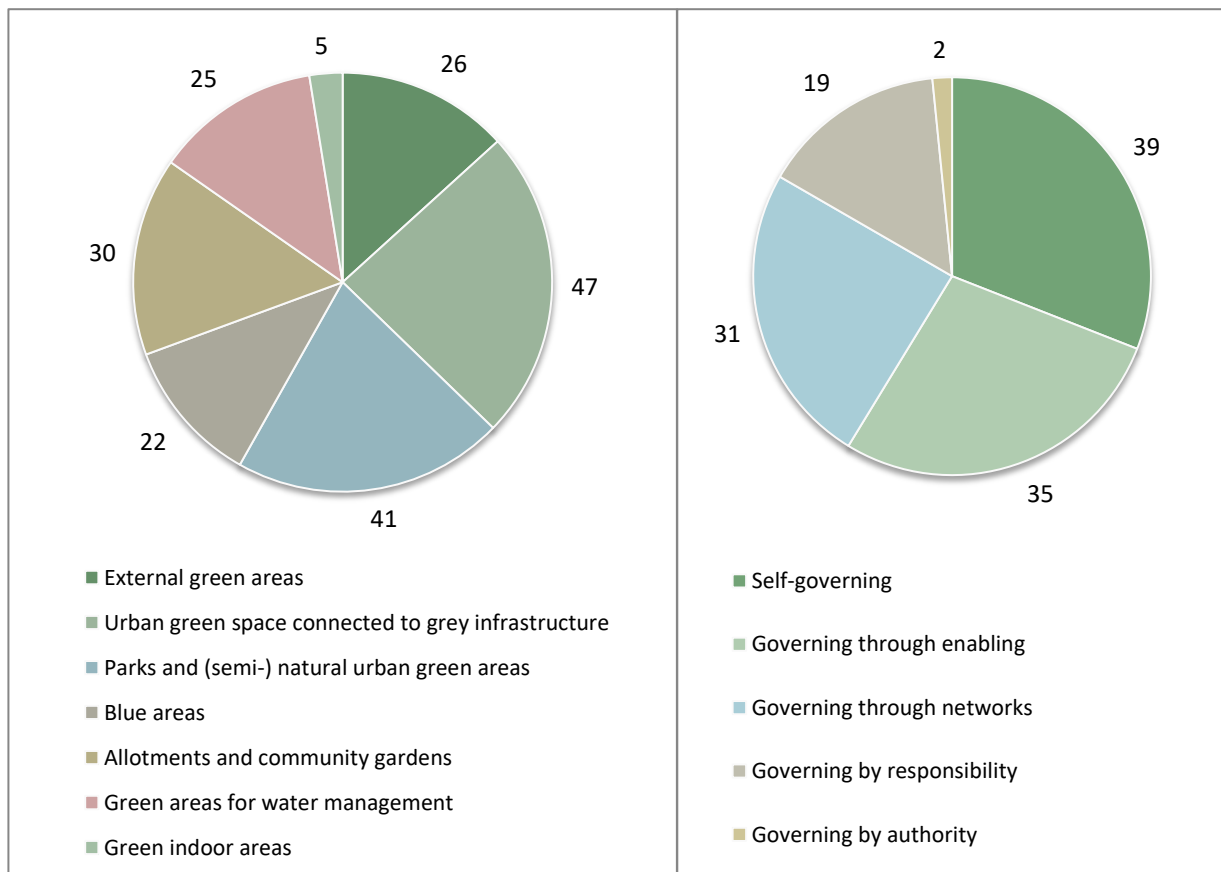


FIG. 4.1. PERCENTAGES OF DIFFERENT TYPES OF NBS

FIG. 4.2. PERCENTAGES OF DIFFERENT GOVERNING STRATEGIES APPLIED

When first analyzing the governing strategies and types of NBS apart from each other, the percentages in which different types of NBS occur in this research range from 5% to 47%, as shown on figure 4.1 above. Urban green space connected to grey infrastructure and parks and (semi-) natural urban green areas are most prevalent in all of the researched NBS initiatives. This is no surprise, as these types are often found in combination with other NBS types, such as green neighborhood pocket parks with water management purposes or (recreational parks) on top of roofs. This is followed by 'allotments and community gardens', as this seems to become an increasingly popular trend, especially within neighborhoods. It appears to be one of the easiest methods for citizens to fulfill the most of their desires, as community gardens can serve as extensions of people's gardens, have educational benefits and increase the social cohesion. Moreover, it gives environmentally concerned citizens a way to contribute in solving environmental issues themselves:

"Children should be able to play outside, residents should get to know each other, work together and enjoy the outdoors. (...) Other goals are cooperation with the community center (herbs and pumpkins for its kitchen), clean air and place for insects and many wild plants, as well as letting children help (instead of destroy)." (De Futseltuyn Gouda, 2019)

Looking at the governing strategies (see figure 4.2), governing through networks, self-governing and governing through enabling are almost equally prevalent in the sample of this research. Especially the high share of self-governing is remarkable, as many societal stakeholders, both from civil society and the market, apparently feel the responsibility to meet (impending) societal, environmental and / or economic issues themselves, often without the help of government resources.

However, many of these initiatives do end up being a product of governing through enabling as well, although (local) enabling policies are often not a direct motivation. Many initiatives, especially those initiated by citizens, are dependent on land and / or partial financial support:

"Together with the children, we thought of what we would like to do with the schoolyard, after which we hired an organization that made a design together with us. We managed to do this with many sponsorships, competitions and subsidies or sponsorships from organizations." (Primary school Floriande Hoofddorp, 2019)

4.1.2. GOVERNING STRATEGIES FOR DIFFERENT TYPES OF NBS

When analyzing the governing strategies applied to all types of NBS, some governing strategies are applied to NBS types more than others.

This is determined through the use of statistical Chi-square tests of independence (χ^2) in combination with a Phi test for the strength and direction of the correlation. The results of these tests are shown in table 4.1 below.

TABLE 4.1. GOVERNING STRATEGIES COMPARISON SCORES OF SIGNIFICANCE BETWEEN GROUPS OF NBS THAT MEET A CERTAIN NBS TYPE AND NBS THAT DO NOT MEET A CERTAIN NBS TYPE

| Governing Strategies Types of NBS | | Self-governing | Governing through enabling | Governing through networks | Governing through responsibility | Governing by authority |
|---|----------------|----------------|----------------------------|----------------------------|----------------------------------|------------------------|
| External Building Greens | X ² | 0.643 | 0.987 | 0.644 | 0.893 | 0.229 |
| | Phi | 0.033 | -0.001 | 0.033 | 0.010 | -0.086 |
| Allotments and Community Gardens | X ² | 0.004** | 0.000** | 0.030* | 0.003** | 0.178 |
| | Phi | 0.204 | 0.273 | -0.156 | -0.209 | -0.096 |
| Green Indoor Areas | X ² | 0.075 | 0.698 | 0.191 | 0.137 | 0.657 |
| | Phi | 0.128 | -0.061 | -0.094 | -0.106 | -0.032 |
| Urban Green Space Connected to Grey Infrastructure | X ² | 0.039* | 0.119 | 0.120 | 0.317 | 0.031* |
| | Phi | -0.148 | -0.112 | 0.111 | 0.072 | 0.155 |
| Parks and (Semi-) Natural Urban Green Areas | X ² | 0.002** | 0.360 | 0.002** | 0.100 | 0.745 |
| | Phi | -0.225 | -0.066 | 0.220 | 0.118 | 0.023 |
| Blue Areas | X ² | 0.001** | 0.245 | 0.004** | 0.417 | 0.173 |
| | Phi | -0.243 | -0.083 | 0.208 | 0.058 | 0.098 |
| Green Areas for Water Management | X ² | 0.011* | 0.000** | 0.009** | 0.001** | 0.986 |
| | Phi | -0.183 | -0.298 | 0.187 | 0.240 | 0.001 |
| * Correlation is significant with a negative relationship at the 0.05 level (2-tailed) | | | | | | |
| ** Correlation is significant with a negative relationship at the 0.01 level (2-tailed) | | | | | | |
| * Correlation is significant with a positive relationship at the 0.05 level (2-tailed) | | | | | | |
| ** Correlation is significant with a positive relationship at the 0.01 level (2-tailed) | | | | | | |
| Small scale / private NBS types | | | | | | |
| Larger scale / public NBS types | | | | | | |

As can be seen in table 4.1 above, the more bottom-up governing strategies (self-governing and governing through enabling) are significantly more prevalent in NBS types including allotments and community gardens, that are often small scaled and / or not necessarily on municipal land.

On the other hand, generally larger scaled NBS types that are commonly located in a more public space are governed by more top down governing strategies: parks and (semi-) natural urban green areas and blue areas both show significant strong positive relationships with governing through networks. Moreover, green areas for water management show a strong positive relationship for both governing through networks and governing through responsibility. The more bottom-up governing strategies of self-governing and governing through enabling are in most cases significantly underrepresented in these types of NBS.

In other words, there is a dichotomy to be recognized between bottom-up governing strategies on the one hand and more top-down strategies on the other hand, in which a governing through networks strategy initiated by the government is considered top-down, as these networks are initiated by the government. This dichotomy is visualized on figure 4.3 below.

On the one hand, there are types of NBS that show to be mainly governed through bottom-up governing strategies. On the other hand, there are multiple types of NBS that show to mainly governed by more top-down governing strategies. For some types of NBS, this dichotomy is more convincing than for others.

For example, green indoor areas show a relatively high share of bottom-up governing strategies, while green areas for water management show a relatively high proportion of top-down governing strategies. This is leveled in the middle, especially with NBS including urban green space connected to gray infrastructure. Looking at the characteristics of the different types of NBS, this is probably mainly due to the owner of the land and the leader of the initiative. First, green indoor areas are usually set up on private grounds. The municipality does not need to be involved these. Next, allotments and community gardens are more often located on municipal land, but are largely initiated and led by citizens, as there is usually no large-scale adaptation of the land that requires a lot of expertise. The dichotomy levels out with NBS including urban green space for gray infrastructure, as they can be located on both public and private land; sometimes this form is applied in connection to public infrastructure such as roads and railways. Other times it is used in connection to private infrastructure, such as office buildings. Subsequently, types of NBS such as blue areas and green areas for water management are often applied on public land, mostly because they have an impact on the existing public green areas and must be applied on a relatively larger scale, requiring specialized knowledge. This means that these forms are often governed by means of top-down governing strategies.

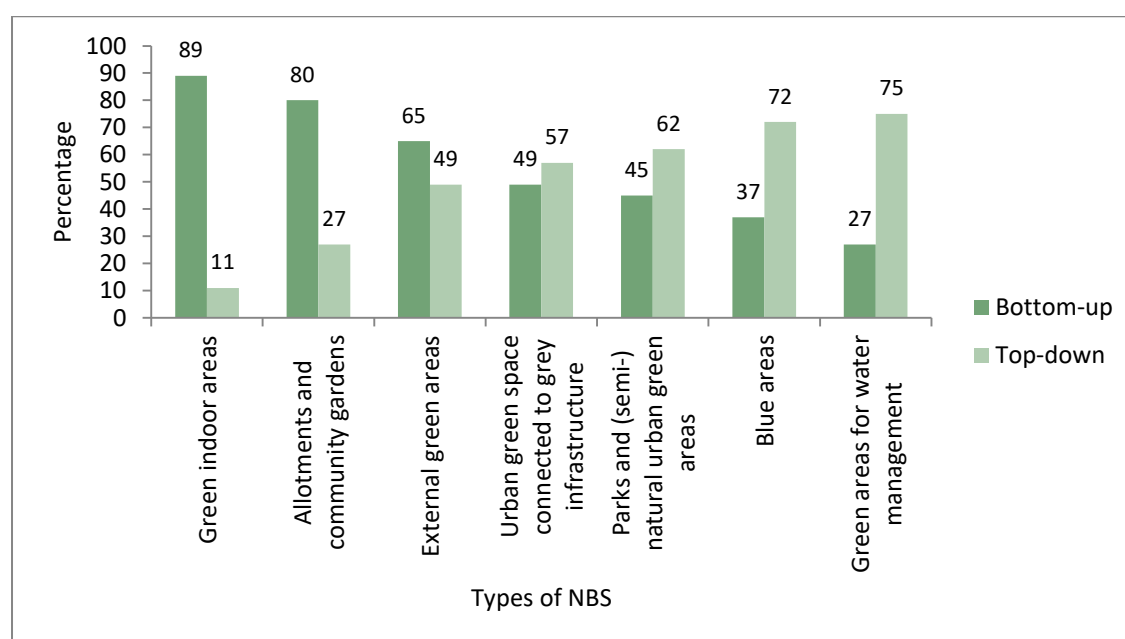


FIG. 4.3. PERCENTAGES OF THE GOVERNING STRATEGIES APPLIED TO THE TYPES OF NBS

In short, governing through networks is the most prevalent governing strategy among Dutch NBS. More top-down governing strategies are applied mainly to generally larger scale public spaces that require more knowledge and other resources, such as 'urban green space connected to grey infrastructure', 'parks and (semi-) natural urban green areas', 'blue areas' and 'green areas for water management'. However, this is not the case for the strategy of governing by authority, as this governing strategy simply does not occur often enough in Dutch municipalities to draw any significant conclusions.

On the other side, allotments and community gardens are implemented more through bottom-up strategies, such as governing through enabling and self-governing, as this is often a relatively easy method to gain many benefits and meet personal desires and aspirations.

4.2. MAINSTREAMING DIFFERENT TYPES OF NBS

This second paragraph aims to search for possible relations between the types of NBS that were identified and researched on the one hand, and the mainstreaming criteria used on the other hand. In this case, the NBS types are the independent variable and the mainstreaming criteria are forming the dependent outcome variable.

4.2.1. PERFORMANCE OF MAINSTREAMING CRITERIA ACROSS ALL NBS

The general performance of the mainstreaming criteria has been analyzed and calculated across all types of NBS. A summary of the distribution of each mainstreaming criterion is shown on figures 4.4 and 4.5 below.

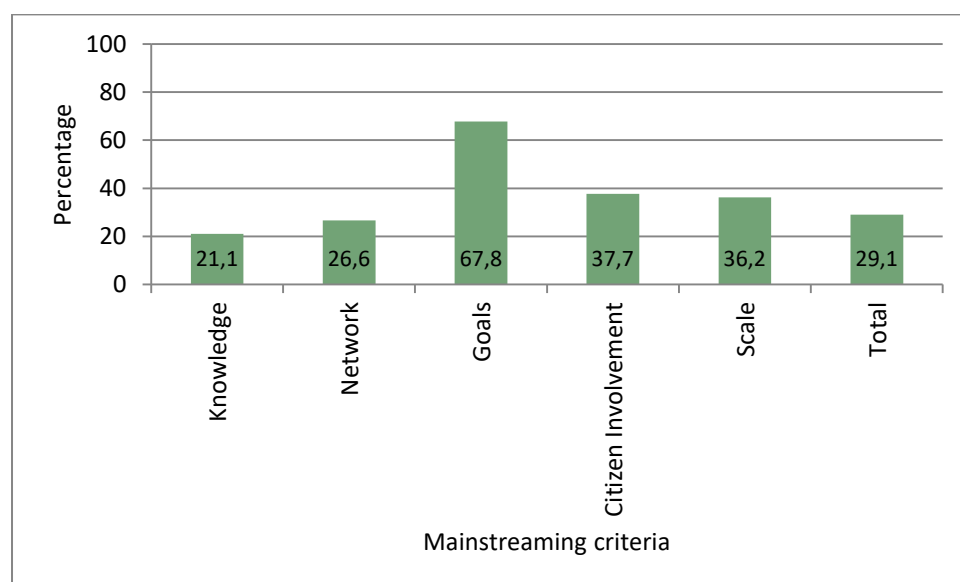


FIG. 4.4. PERCENTAGE OF TOTAL NBS THAT MEETS / EXCEEDS THE 3.5 THRESHOLD SCORE FOR EACH MAINSTREAMING CRITERION

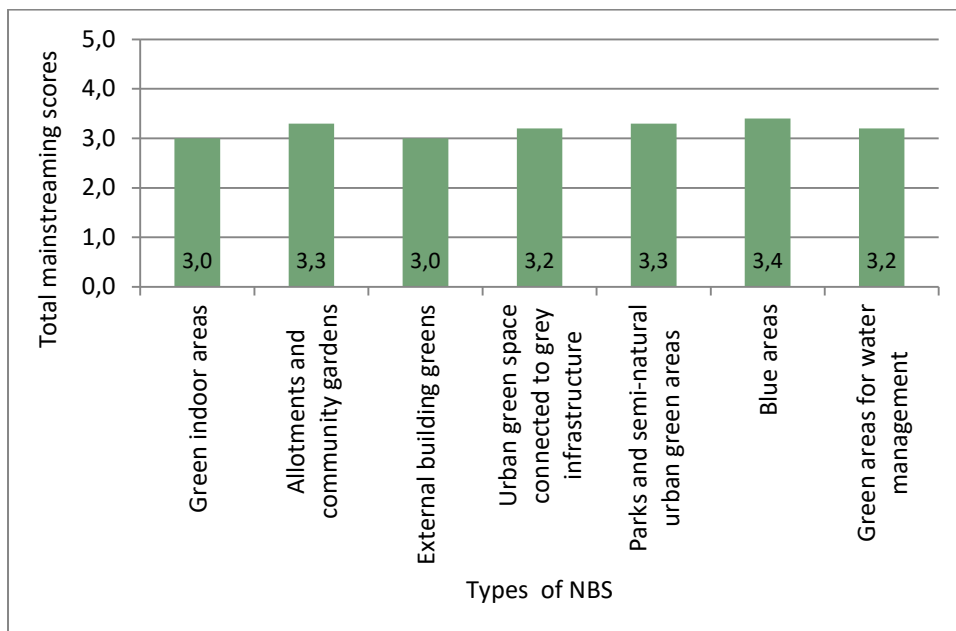


FIG. 4.5. AVERAGE TOTAL MAINSTREAMING SCORE FOR EACH TYPE OF NBS

According to the earlier developed mainstreaming criteria, all of the researched NBS can achieve scores that range from 1 to 5. Therefore, 1 is the lowest, in which the mainstreaming criterion is not met, and 5 is the highest, meaning that the mainstreaming criterion is met perfectly. However, in practice, these scores are very rare. Therefore, a score of at least 3.5 is considered mainstream.

When looking at the performance of the different mainstreaming criteria, the criterion of goals is showing the best scores. In contrast, knowledge is showing the worst scores. These relatively low values indicate a small contribution and development of knowledge for an NBS. This is an unexpected outcome, as knowledge is an important factor in the accountability of stakeholders towards other stakeholders that are often involved in an initiative. Moreover, as concluded from existing literature, knowledge is crucial for the awareness and sense of urgency regarding nature and NBS for both governmental and societal actors. It also helps guarantee the success of an NBS. Increased knowledge about NBS can easily be gained especially through evaluation and monitoring of the initiative; this can eventually help in the success of the NBS initiative:

“We have a loan agreement with the municipal Real Estate department. They will soon determine whether it will be extended. We show by visitor numbers and all activities that take place that the initiative has a right to exist and we have committed to continue the school garden education with volunteers in this place.” (Buurttuin Zoete Aarde Zoetermeer, 2019)

When looking at the average scores of mainstreaming in total for each type of NBS, as shown on figure 4.5, the scores do not vary highly at first sight. However, when looking more closely, one can see a few differences in total score; blue areas are showing the highest total mainstreaming scores, while nature attached to either the interior or exterior of building is showing the lowest scores. However, when taking the same dichotomy between NBS on private / public grounds, this does not

seem to apply as strongly for mainstreaming. The following paragraph aims to find proof for these correlations.

4.2.2. EVALUATING MAINSTREAMING PER TYPE OF NBS

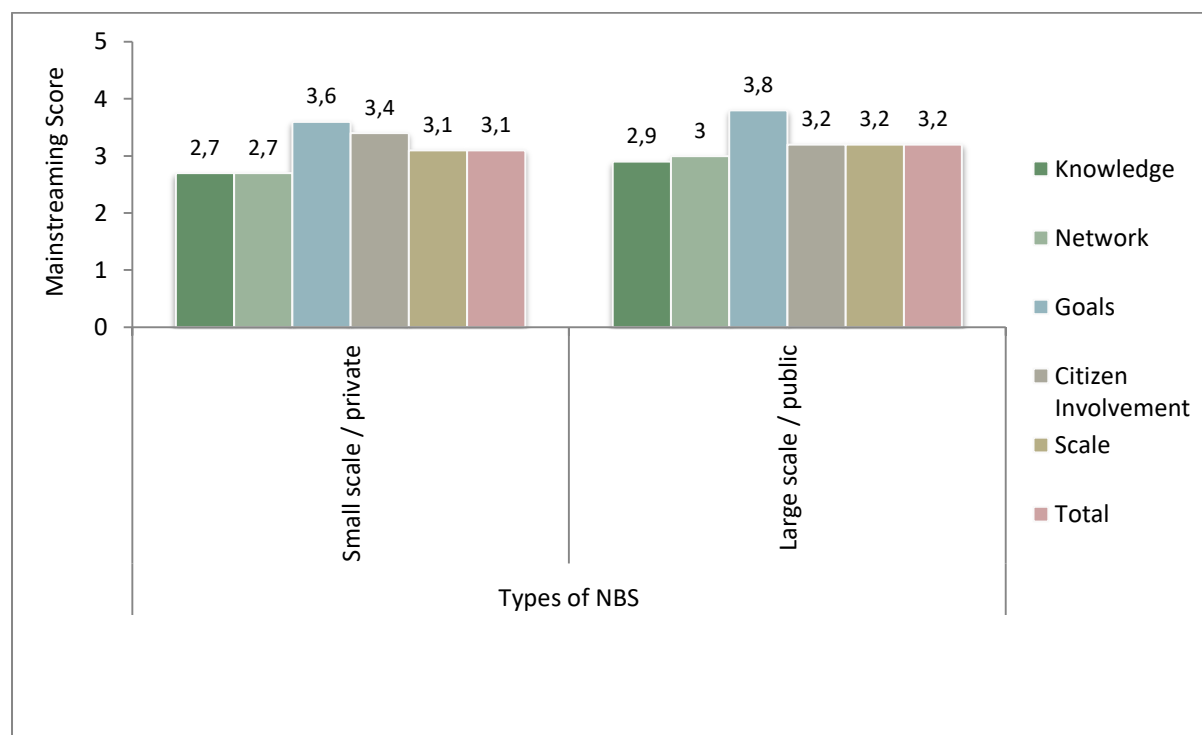


FIG. 4.6. GENERAL MAINSTREAMING SCORES PER TYPE OF NBS

When looking at the total scores for the types of NBS, the averages ranged from 2.7 to 3.8 (see figure 4.6 above). Only the mainstreaming criterion of goals scores higher than the threshold score of 3.5. In other words, the researched NBS indicate a generally weak performance for their mainstreaming characteristics. In total, 29% of the NBS that were researched in this thesis had an overall mainstreaming score of 3.5 or higher.

At first glance, there are no clear differences to be recognized between both categories of NBS, apart from the fact that large scale NBS generally performed better on most criteria. Statistical tests are performed to check if the difference in mainstreaming scores between the types of NBS is large enough to be significant and if there are possibly more significant relationships.

TABLE 4.2. MAINSTREAMING CRITERIA COMPARISON SCORES OF SIGNIFICANCE BETWEEN GROUPS OF NBS THAT MEET A CERTAIN NBS TYPE AND NBS THAT DO NOT MEET A CERTAIN NBS TYPE

| Mainstreaming criteria Types of NBS | Knowledge | Network | Goals | Citizen Involvement | Time / Spatial Scale | Total |
|---|-------------|-------------|-------------|------------------------|----------------------------|-------------|
| External Building Greens | 0.262 (-) | 0.296 (-) | 0.238 (-) | 0.014** (-) | 0.331 (-) | 0.019** (-) |
| Allotments and Community Gardens | 0.177 (-) | 0.727 (-) | 0.447 (+) | 0.000** (+) | 0.485 (+) | 0.073 (+) |
| Green Indoor Areas | 0.289 (-) | 0.677 (-) | 0.258 (-) | 0.683 (-) | 0.684 (-) | 0.380 (-) |
| Urban Green Space Connected to Grey Infrastructure | 0.810 (+) | 0.430 (+) | 0.850 (-) | 0.120 (-) | 0.186 (-) | 0.518 (-) |
| Parks and (Semi-) Natural Urban Green Areas | 0.010** (+) | 0.002** (+) | 0.058 (+) | 0.734 (+) | 0.011* (+) | 0.001** (+) |
| Blue Areas | 0.001** (+) | 0.013* (+) | 0.018* (+) | 0.188 (-) | 0.802 (+) | 0.003** (+) |
| Green Areas for Water Management | 0.526 (-) | 0.145 (+) | 0.001** (+) | 0.002** (-) | 0.159 (+) | 0.379 (+) |
| * Correlation is significant with a negative relationship at the 0.05 level (2-tailed) | | | | | | |
| ** Correlation is significant with a negative relationship at the 0.01 level (2-tailed) | | | | | | |
| * Correlation is significant with a positive relationship at the 0.05 level (2-tailed) | | | | | | |
| ** Correlation is significant with a positive relationship at the 0.01 level (2-tailed) | | | | | | |

(-) Negative relation

(+) Positive relation

As can be seen in table 4.2 above, there are multiple relationships showing to be significant. As suspected, generally larger scaled NBS types indeed show significantly higher scores on most mainstreaming criteria than the NBS that do not belong to these types. Especially knowledge, network and goals are showing relatively high scores:

- In this case, the mainstreaming criteria of knowledge and networks are intertwined; the larger the scale of an NBS, the higher the involvement of other stakeholders, both from other government departments and market and societal organizations, creating one large network. All these stakeholders in a network have the ability to provide knowledge and resources that complement each other.
- The higher score for the criterion of goals is no surprise either, as awareness of the possible co-benefits of NBS and the resulting predefined goals are central to the definition of NBS. This is especially applicable to larger scale NBS on public ground, as predefined goal help guarantee a successful implementation of the initiative on the long term. Also, any alterations on public grounds, especially for which many resources are often required, often require to be implemented with a specific vision in mind, in order to get through the decision-making process. Moreover, central goals are an important motivating factor for people to initiate an NBS project in the first place:

“The reason for the construction of Park Lingezegen is the urbanization of the Arnhem-Nijmegen central area. The cities of Arnhem and Nijmegen are expanding further and further. The municipality of Overbetuwe is also growing. The middle area between the cities

is [...] shrinking rapidly. About 20 years ago, the province of Gelderland took the initiative to ensure that the green, open area is preserved, [...] maintaining a green, open space in the middle area of Arnhem-Nijmegen to sustainably safeguard the residential and business climate for businesses in the area. [...] There will be more space for nature, recreation, water (retention) and there will still be room for agriculture.” (Park Lingezege Elst, 2019)

However, also types of NBS that have already shown to perform relatively well, including blue areas and parks and (semi-) natural urban green areas can still benefit from the practices of other types. For example, parks and (semi-) natural urban greens areas can improve their score for the criterion of goals, by including more elements from other types of NBS, such as blue areas like ponds and fountains and / or green areas for water management like rain gardens (see figure 4.7 on the right) and bioswales. Within these types of NBS, these measures are often taken for the purpose of ground water infiltration and reducing flood risk.



FIG. 4.7. ZOHO RAIN GARDEN ROTTERDAM (PRIVATE COLLECTION, 2019)

However, specifically one mainstreaming criterion is generally lacking within these types of NBS: bottom-up citizen involvement. Involving citizens is crucial in mainstreaming NBS, as it increases the climate and environmental awareness of citizens. This on its turn increases both the legitimacy of the government actors involved and, since citizens are often most affected, the success of the NBS on the long term.

On the other hand, smaller scaled NBS, specifically in the form of allotments and community gardens, score significantly higher on citizen involvement. This can be explained through the fact that NBS such as allotments and community gardens depend on the constant active involvement of multiple (citizen) stakeholders. This cannot be taken for granted or are not always necessary in other types of NBS. For example, some other private types of NBS are implemented bottom-up, but fully within a market organization, still without much citizen involvement. In other public larger-scaled types of NBS, citizen involvement is not self-evident either. However, there are exceptions, which these types of NBS are able to learn from; some of the NBS investigated do allow citizens and local residents to actively participate and participate in the initiative. In fact, in many cases, citizens much appreciate this involvement:

“A consult with the municipality took place to discuss the possibilities for citizen involvement. (...) Citizens showed their decisiveness and the municipality gives confidence in the active citizens. (...) An annual contract is signed; (...) beautiful new initiatives are set up and implemented. The neighborhood loves it and feels more strongly connected to the environment.” (IamSonsbeeck Park Breda, 2019)

As this quote indicates, citizens are actively involved in the set-up and implementation of new initiatives within this specific park. This intensive cooperation with the (local) government, especially within the planning process, ensures that large-scaled NBS on the public land can also achieve a high mainstreaming score regarding citizen involvement, which is often lacking in these types of NBS. In addition to this specific NBS in the municipality of Breda, there are more exceptions to be recognized, almost all of which use the input of citizens in planning and designing the NBS, usually through intensive taskforce groups. This usually concerns the future users of the NBS, to increase the appreciation and chance of success of the initiative. For example, the Zuiderpark sports park in The Hague has been set up in close collaboration with students from the nearby community college, as they will make the most use of the new park. This way, they are able to share their wishes, so that they get the best out of the new future park. However, such collaborations do not necessarily have to be very intensive and formal. At the Groene Wig-Malberg Park in Maastricht, for example, an accessible workgroup with children was used to guarantee their playing needs in the park as much as possible.

On the one hand, governments might consider this form of citizen involvement in the planning and implementation processes as a factor through which efficiency is possibly lost. However, this form of citizen involvement, especially during the planning process, is of great importance in the long term, as it will make citizens feel more involved in the initiative and the rest of the environment. This will cause for an NBS to be better cared for and valued more. After all, citizens are often the users of the NBS.

Moreover, allotments and community gardens are popular bottom-up initiatives, as they are a relatively easy and familiar way for citizens to gain a lot of (visible) benefits. If more effort would be put into NBS such as green roofs, to make these more visible throughout urban areas, raise awareness on the benefits of external building greens and possibly organize municipal green roof projects on the neighborhood level, the share of bottom-up citizen contributions will likely increase.

In general, multiple larger scaled NBS on more public grounds perform significantly better in mainstreaming than other types. Although these still show areas on which they can improve. On the other hand, external building greens, belonging to the smaller scaled NBS often located on private grounds, perform significantly worse than other NBS types.

4.3. GOVERNING STRATEGIES AND MAINSTREAMING

The third paragraph aims to find existing relationships between the governing strategies applied to NBS in the Netherlands and the mainstreaming criteria these NBS meet. In this case, governing strategies are the independent variable and the mainstreaming criteria are forming the dependent outcome variable.

4.3.1. MAINSTREAMING PER GOVERNING STRATEGY

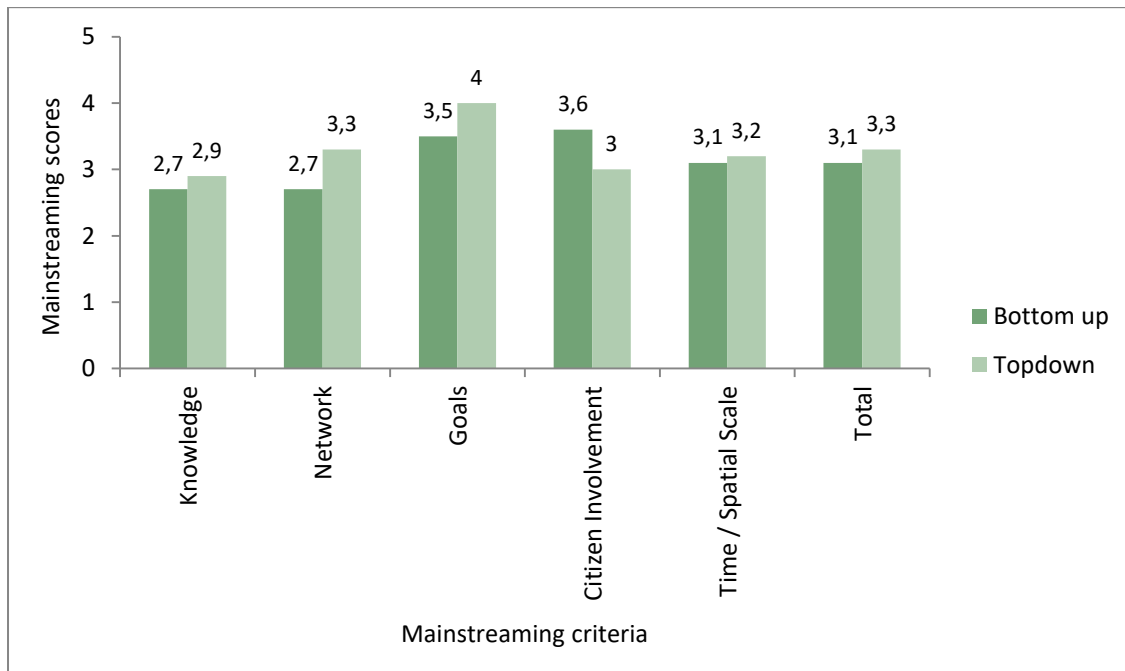


FIG. 4.8. GENERAL MAINSTREAMING SCORES PER GOVERNING STRATEGY¹

As mentioned in the previous paragraph, all of the researched NBS can achieve scores for their mainstreaming criteria ranging from 1 to 5, in which a score of at least 3.5 is considered mainstream.

When analyzing these scores for all different types of NBS, the average scores for all types of NBS per government strategy ranged from 2.7 to 4.0, as shown on figure 4.8 above. In other words, when looking at the relationships between mainstreaming and governing strategies, they show some slightly higher average scores, in contrast to the different types of NBS in the previous paragraph; 3 of the average total scores for mainstreaming met the threshold score of 3.5.

In comparison to the relationships with the different types of NBS, the mainstreaming scores are less evenly distributed among the different governing strategies. For example, the mainstreaming criterion of citizen involvement is showing relatively high scores for the more bottom-up governing strategies including societal self-governing and governing through enabling. This makes sense, as the market or civil society is almost always the initiator within these governing strategies.

In order to prove if the difference in mainstreaming scores between the governing strategies is large enough to be significant, an in-depth Mann-Whitney U Test is executed for all individual governing strategies and mainstreaming criteria. This test determines whether the mainstreaming criteria are

¹ The same dichotomy as pointed out in the previous paragraph is used in this graph, purely for the sake of presentation. Therefore, societal self-governing and governing by enabling both fall under the category of bottom-up governing strategies. Governing through networks, governing through responsibility and governing by authority fall under the category of top-down governing strategies.

generally met for each different governing strategy. Table 4.3 shows the outcomes of this statistical test.

TABLE 4.2. MAINSTREAMING CRITERIA COMPARISON SCORES OF SIGNIFICANCE BETWEEN GROUPS OF NBS THAT MEET A CERTAIN NBS TYPE AND NBS THAT DO NOT MEET A CERTAIN NBS TYPE

| Mainstreaming criteria | Knowledge | Network | Goals | Citizen Involvement | Time / Spatial Scale | Total |
|---|-------------|-------------|-------------|---------------------|----------------------|-------------|
| Governing Strategies | | | | | | |
| Societal self-governing | 0.002** (-) | 0.000** (-) | 0.000** (-) | 0.000** (+) | 0,073 (-) | 0,000** (-) |
| Governing through enabling | 0.973 (-) | 0.117 (-) | 0.851 (+) | 0.000** (+) | 0.756 (-) | 0.225 (-) |
| Governing through networks | 0.000** (+) | 0.000** (+) | 0.000** (+) | 0.013* (-) | 0.000** (+) | 0.000** (+) |
| Governing through responsibility | 0,367 (-) | 0,003** (-) | 0,523 (+) | 0,000** (-) | 0,080 (-) | 0,000** (-) |
| Governing by authority | 0.931 (+) | 0.417 (+) | 0.845 (-) | 0.294 (-) | 0.898 (-) | 0.710 (-) |
| * Correlation is significant with a negative relationship at the 0.05 level (2-tailed) | | | | | | |
| ** Correlation is significant with a negative relationship at the 0.01 level (2-tailed) | | | | | | |
| * Correlation is significant with a positive relationship at the 0.05 level (2-tailed) | | | | | | |
| ** Correlation is significant with a positive relationship at the 0.01 level (2-tailed) | | | | | | |

(-) Negative relation

(+) Positive relation

From this table above, it can be concluded that the more bottom-up governing strategies including societal self-governing and governing through enabling show significantly higher scores for the mainstreaming criterion of citizen involvement than the more top-down governing strategies of governing through networks and governing through responsibility. These more top-down governing strategies, especially governing through responsibility, are largely characterized by efficiency, as governments only have limited capacities. This could be an important reason why citizen involvement is not always desired.

However, in contrast, the mainstreaming criterion of network shows relatively lower scores for societal self-governing, while especially the governing strategy of governing through networks is showing higher scores. This is also no surprise, as a government has the resources to find and create a network, as it has access to all sectors and layers of society:

“The municipality of Amsterdam took on the role of Mediator of Innovation and brought the municipality, the stakeholders, the business community and the knowledge institution together.”
(Smartroof 2.0 Amsterdam, 2019)

Also, when a government stakeholder is pursuing a network strategy for an NBS, it makes sense that it fulfills many of the requirements to score well on the mainstreaming criterion of network. However, this does not necessarily mean that NBS implemented bottom-up do not have the ability to create a network and increase their mainstreaming performance on other criteria:

After the request from the municipality, the first initiator composed a team of social entrepreneurs. (...) They have recruited participants through various meetings (...). With social media, we have generated attention for our activities, which has enabled the group to grow. (...) We took care of part of the green maintenance of the site. (...) In doing so, we learned how to best set up and organize the garden. A foundation has been formed and volunteers with knowledge of vegetable gardening have been recruited. Through committees, participants are taking more and more responsibility for the organization. Necessary for the realization is a few very motivated leaders who want to invest a lot of time and energy into this. (Stadstuinderij Venlo, 2019)

However, one does have to keep in mind that the mainstreaming criteria all respond to and influence each other. That is a reason why governing through networks is showing higher scores for most mainstreaming criteria: a governing through networks strategy will almost automatically score high for the mainstreaming criteria of network. Moreover, when pursuing a formal network, it is necessary to formulate ambitious goals and to plan everything properly in order to attract stakeholders to such a network in the first place. In other words, this almost automatically causes for high scores on the criteria of 'goals' and 'time scale'. In addition, stakeholders in a network provide more resources, such as knowledge and financial resources, which can also help increase the spatial scale. Therefore, although governing through networks does show to be the best strategy when boosting mainstreaming, this does not mean that other governing strategies are not suitable. It is simply more difficult for these governing strategies to achieve high mainstreaming scores, as more effort has to be put specifically into these criteria. For example, an NBS implemented through societal self-governing often has a more informal character. This makes it more difficult to attract other stakeholders into a possible network, as (1) there is limited access to other possible stakeholders and (2) there is limited need and interest for detailed planning and goals. Also, especially once an NBS is implemented by a group of local citizens, there is a lack of knowledge to be shared, and a lack of financial resources to implement the NBS on a larger spatial scale.

In short, governing through networks is the most suitable governing strategy in order to boost mainstreaming. Especially societal self-governing and governing through responsibility are running behind on this matter. However, as the mainstreaming criteria almost automatically respond to each other, especially for this governing strategy, this is slightly more nuanced. Moreover, just like the other strategies, the governing through networks strategy still requires some additional attention, specifically towards the more intense involvement of citizens in the process. This criterion is guaranteed more within governing strategies such as governing through enabling and self-governing; in which citizens have more power throughout the entire implementation process.

4.4. TYPES OF NBS, GOVERNING STRATEGIES AND MAINSTREAMING

Table 4.4 below shows an overview of all analyzed variables from the last paragraphs combined. Multiple aspects stand out from this table. First, when looking at the total mainstreaming scores, nearly all types of NBS have the capability of contributing to the process of mainstreaming NBS. Only for green indoor areas, this effect cannot be proven. All other types of NBS are governed through certain strategies that perform relatively well on mainstreaming. However, what is striking is that this well performing governing strategy is the same for all these types of NBS: the governing through

networks strategy shows significantly higher scores than any other governing strategy, whether these are more top-down or more bottom-up.

These relatively high scores are reached especially through the provision and generation of knowledge and the involvement of a large number of stakeholders that already indicate a network. However, citizen involvement is lacking behind for some types of NBS. Especially for allotments and community gardens, this could be improved. This is remarkable, as allotments and community gardens are most often set up and implemented by citizens. However, it seems that once horticulture becomes increasingly commercially oriented and large scale, citizens no longer find access.

In other words, there is definitely an effect of governing onto mainstreaming. However, in contrast to what the research hypotheses stated earlier in this thesis, this governing strategy is the same for each type of NBS: a governing through networks strategy has a higher chance of contributing to the mainstreaming process than any other governing strategy, for every type of NBS.

TABLE 4.4. OVERVIEW OF ALL FINDINGS FROM ALL VARIABLES COMBINED

| | | Knowledge | Network | Goals | Bottom-up | Scale | Total |
|--|---|------------|-------------|-------------|-------------|-------------|-------------|
| External building greens | Self-governing | 0.072 (-) | 0.061 (-) | 0.019* (-) | 0.241 (+) | 0.348 (-) | 0.037* (-) |
| | Governing through enabling | 0.678 (-) | 0.546 (-) | 0.598 (+) | 0.040* (+) | 0.865 (-) | 0.656 (+) |
| | Governing through networks | 0.189 (+) | 0.000** (+) | 0.045* (+) | 0.504 (+) | 0.064 (+) | 0.001** (+) |
| | Governing through responsibility | 0.511 (+) | 0.438 (-) | 0.755 (-) | 0.007** (-) | 0.401 (-) | 0.190 (-) |
| | Governing by authority | No data | No data | No data | No data | No data | No data |
| Allotments and community gardens | Self-governing | 0.048* (-) | 0.257 (-) | 0.000** (-) | 0.002** (+) | 0.250 (-) | 0.014* (-) |
| | Governing through enabling | 0.365 (+) | 0.038* (-) | 0.678 (+) | 0.064 (+) | 0.184 (-) | 0.811 (-) |
| | Governing through networks | 0.222 (+) | 0.000** (+) | 0.034* (+) | 0.003** (-) | 0.013* (+) | 0.002** (+) |
| | Governing through responsibility | 0.501 (+) | 0.447 (-) | 0.139 (+) | 0.002 (-) | 0.465 (+) | 0.853 (-) |
| | Governing by authority | No data | No data | No data | No data | No data | No data |
| Green indoor areas | Self-governing | 0.143 (-) | 0.250 (-) | 0.143 (-) | 0.393 (-) | 0.143 (-) | 0.071 (-) |
| | Governing through enabling | 0.429 (+) | 0.857 (+) | 0.643 (+) | 0.286 (+) | 0.643 (+) | 0.429 (+) |
| | Governing through networks | 0.500 (+) | 0.250 (+) | 0.250 (+) | 1.000 | 0.250 (+) | 0.250 (+) |
| | Governing through responsibility | No data | No data | No data | No data | No data | No data |
| | Governing by authority | No data | No data | No data | No data | No data | No data |
| Urban green space connected to grey infrastructure | Self-governing | 0.054 (-) | 0.000** (-) | 0.007** (-) | 0.000** (+) | 0.110 (-) | 0.013* (-) |
| | Governing through enabling | 0.371 (-) | 0.097 (-) | 0.923 (+) | 0.000** (+) | 0.847 (-) | 0.824 (+) |
| | Governing through networks | 0.023* (+) | 0.000** (+) | 0.119 (+) | 0.022* (-) | 0.001** (+) | 0.000** (+) |
| | Governing | 0.969 (+) | 0.044* (-) | 0.668 (-) | 0.001** (-) | 0.094 (-) | 0.015* (-) |

| | | | | | | | |
|---|---|-------------|-------------|-------------|-------------|-----------|-------------|
| | through responsibility | | | | | | |
| | Governing by authority | 0.963 (+) | 0.543 (+) | 0.859 (-) | 0.448 (-) | 0.963 (+) | 0.787 (-) |
| Parks and (semi-) natural urban green areas | Self-governing | 0.053 (-) | 0.004** (-) | 0.009** (-) | 0.002** (+) | 0.118 (-) | 0.003** (-) |
| | Governing through enabling | 0.413 (-) | 0.261 (-) | 0.368 (-) | 0.000** (+) | 0.582 (+) | 0.791 (+) |
| | Governing through networks | 0.064 (+) | 0.000** (+) | 0.265 (+) | 0.085 (-) | 0.078 (+) | 0.000** (+) |
| | Governing through responsibility | 0.657 (-) | 0.005** (-) | 0.651 (+) | 0.000** (-) | 0.548 (-) | 0.015* (-) |
| | Governing by authority | 0.579 (-) | 0.597 (+) | 0.824 (+) | 0.717 (-) | 0.802 (-) | 0.964 (-) |
| Blue areas | Self-governing | 0.146 (-) | 0.374 (-) | 0.027* (-) | 0.001** (+) | 0.408 (-) | 0.297 (-) |
| | Governing through enabling | 0.399 (-) | 0.165 (-) | 0.544 (-) | 0.002** (+) | 0.945 (-) | 0.536 (-) |
| | Governing through networks | 0.034* (+) | 0.000** (+) | 0.408 (+) | 0.126 (-) | 0.225 (+) | 0.010** (+) |
| | Governing through responsibility | 0.226 (-) | 0.001** (-) | 0.805 (-) | 0.192 (-) | 0.942 (-) | 0.014* (-) |
| | Governing by authority | 0.678 (-) | 0.718 (+) | 0.883 (+) | 0.167 (-) | 0.114 (-) | 0.595 (-) |
| Green areas for water management | Self-governing | 0.002** (-) | 0.222 (-) | 0.008** (-) | 0.000** (+) | 0.502 (-) | 0.030* (-) |
| | Governing through enabling | 0.099 (-) | 0.062 (-) | 0.027* (-) | 0.555 (+) | 0.092 (-) | 0.009** (-) |
| | Governing through networks | 0.000** (+) | 0.000** (+) | 0.076 (+) | 0.634 (-) | 0.220 (+) | 0.000** (+) |
| | Governing through responsibility | 0.921 (+) | 0.002** (-) | 0.646 (+) | 0.004** (-) | 0.752 (-) | 0.049* (-) |
| | Governing by authority | 1.000 | 0.917 (+) | 0.792 (-) | 0.583 (+) | 0.667 (+) | 0.958 (-) |

* Correlation is significant with a negative relationship at the 0.05 level (2-tailed)

** Correlation is significant with a negative relationship at the 0.01 level (2-tailed)

* Correlation is significant with a positive relationship at the 0.05 level (2-tailed)

** Correlation is significant with a positive relationship at the 0.01 level (2-tailed)

5. CONCLUSION AND DISCUSSION

In this concluding chapter of this thesis, the main research question will be answered by using the findings in the last chapter. Subsequently, recommendations are made in response to these research outcomes, with regard to current practices and processes surrounding NBS governing. Also, more recommendations are made for possible follow-up researches. This chapter will then end with a reflection on the procedures and choices made in this research.

5.1. CONCLUSIONS

This research aimed to identify what (local) governing strategies are most suitable for the mainstreaming of which types of Nature-Based Solutions.

TABLE 5.1. TOTAL MAINSTREAMING COMPARISON SCORES OF SIGNIFICANCE BETWEEN DIFFERENT TYPES OF NBS AND GOVERNING STRATEGIES

| | Self-governing | Governing through enabling | Governing through networks | Governing through responsibility | Governing by authority |
|---|----------------|----------------------------|----------------------------|----------------------------------|------------------------|
| External building greens | 0.037* (-) | 0.656 (+) | 0.001** (+) | 0.190 (-) | No data |
| Urban green space connected to grey infrastructure | 0.013* (-) | 0.824 (+) | 0.000** (+) | 0.015* (-) | 0.787 (-) |
| Parks and (semi-) natural urban green areas | 0.003** (-) | 0.791 (+) | 0.000** (+) | 0.015*(-) | 0.964 (-) |
| Blue areas | 0.297 (-) | 0.536 (-) | 0.010** (+) | 0.014* (-) | 0.595 (-) |
| Allotments and community gardens | 0.014* (-) | 0.811 (-) | 0.002** (+) | 0.853 (-) | No data |
| Green areas for water management | 0.030* (-) | 0.009** (-) | 0.000** (+) | 0.049* (-) | 0.958 (-) |
| Green indoor areas | 0.071 (-) | 0.429 (+) | 0.250 (+) | No data | No data |
| * Correlation is significant with a negative relationship at the 0.05 level (2-tailed) | | | | | |
| ** Correlation is significant with a negative relationship at the 0.01 level (2-tailed) | | | | | |
| ** Correlation is significant with a positive relationship at the 0.01 level (2-tailed) | | | | | |

By both quantitatively and qualitatively analyzing the characteristics practices of 199 NBS initiatives throughout the Netherlands, it can be concluded that there is one specific policy strategy that best guarantees mainstreaming of almost all types of NBS, as shown on table 5.1 above. This is the governing strategy of governing through networks. This has been determined through the use of predefined variables and indicators, derived from multiple literature sources. By using these variables and indicators, the positive mainstreaming scores for this governing strategy can be explained.

First, a governing network ensures that an increased amount of resources are brought together, in order to achieve more ambitious goals. These resources can consist of both financial and non-financial resources in the form of knowledge, land, labor, etc. Especially financial resources, land and labor are relevant for the spatial scale of an initiative; the more financial resources, land and labor

forces, the more possibilities for an NBS to be implemented on a larger spatial scale. This is an important criterion in the mainstreaming process, as larger spatial scaled initiatives have a higher chance of being implemented in policies from higher government levels. Moreover, the more actors involved in the policy network, the higher the chance that similar initiatives will be implemented in other contexts, further increasing the spatial scale, and therefore mainstreaming, of NBS. On the other hand, knowledge resources can help to boost the mainstreaming process of NBS by raising awareness of all actors involved, which increases the implementation of similar initiatives in the long term. In addition, knowledge in a network is important for sharing technological innovations; experimental initiatives can be conducted with new technologies, so that NBS will have a greater chance of success in the future.

Secondly, a policy network requires carefully considered decisions and elements of an initiative; the more actors in a network, the greater the need for the parties involved to be accountable to each other, as a greater number of parties depend on the success of the initiative. Initiators can easily increase this chance of success by formulating clear social, economic and / or environmental goals; the clearer and more central the goal, the greater the chance of conflicting goals and the more motivation to pursue these together as a network. Also, by making an extensive iterative planning, this accountability and chance of success can be further increased. This helps to increase the time scale of an NBS initiative, which is also an important criterion in mainstreaming.

However, this conclusion requires to be slightly nuanced due to multiple factors, in order to suit the actual practices in reality. First, as the above explanation might already indicate, most mainstreaming criteria are somehow interdependent, which especially helps to boost scores for governing through networks. When governing through networks is the desired strategy for implementing an NBS initiative, it is necessary to formally capture as much detail as possible, draw up formal contracts and take measures to ensure success of the NBS in order to attract stakeholders to the network in the first place, as these stakeholders depend on the success of the initiative. As a result, high scores are almost automatically expected for the formulation of ambitious goals and long-term planning. In addition, these stakeholders are capable to provide knowledge and financial resources, also making it easier to increase the spatial scale of the initiative. Other governing strategies do not necessarily aspire to govern through a network, making it more difficult to achieve high scores for most mainstreaming criteria; since these score are not achieved as automatically, more active attention must be put into these criteria.

In addition, despite the fact that policy networks have the greatest chance of success in the mainstreaming process, this strategy is by no means applied to all types of NBS. Policy networks are currently mainly used for larger scaled NBS types, located mostly on public ground, such as green areas for water management and parks and (semi-) natural urban green areas. These types of NBS are more often dependent on more resources and specialized knowledge, for which networks offer solutions. The more small-scaled private / community-initiated NBS on the other hand, generally make much less use of networks, and thus show much lower scores for mainstreaming. This applies to types of NBS such as community gardens and green roofs.

This leads to the second nuancing factor; the literature used for the theoretical framework has a very policy-oriented vision on mainstreaming. According to mainstreaming literature, NBS are

considered mainstream once they are integrated into policy. Therefore, bottom-up governing strategies, especially in the form of societal self-governing, have by definition no chance of success, as the government is usually not a stakeholder within these NBS. But just because NBS governed through societal self-governing are not provided with or generate much formal knowledge, and do not have formally considered goals and time and spatial plans, this does not mean that these criteria are not considered at all; within societal self-governing, these formal processes and plans might often not be necessary, as these NBS are often implemented on a very local scale, in which all involved citizens and other societal stakeholders possess their own knowledge about the local context and its state of affairs. This makes formal evaluations and monitoring often unnecessary. For example, as the citizens involved are often on top of situation, they are able to recognize any development; something that is often more difficult with more large-scale top-down initiatives. Moreover, the smallest-scaled neighborhood initiatives often have the most detailed targeted goals, also because those involved, often in the form of local residents, can better recognize the problems themselves than a government actor could. In other words, this is another factor that nuances the high scores for governing through mainstreaming.

Lastly, the governing strategy of governing through networks does not show high mainstreaming scores for every criterion; it generally lacks citizen involvement. In fact, this is an issue for all top-down governing strategies. As (local) governments often have limited resources, they largely depend on efficiency. However, that is at the expense of mainstreaming. This efficiency is reflected in the lack of other stakeholders involved in the decision-making process, especially in the form of citizens.

5.2. RECOMMENDATIONS

5.2.1. PRACTICAL RECOMMENDATIONS

In order for NBS to have the highest chance of contributing to mainstreaming, a number of factors are important to be considered, especially for practitioners at local governments. Central to these factors is the formation of the largest possible network. If a government does not pursue such a strategy, an NBS has little chance of acquiring new knowledge and expanding into other contexts. In addition, it does not benefit the legitimacy of government measures in the long run; especially by involving the future users and beneficiaries in the applied measures, satisfaction, acceptance and a sense of recognition and contribution are increased, so that ultimately, more societal goals can be achieved. Therefore, Local governments should try to involve stakeholders from multiple parts of society, such as the market, stakeholders from other government levels and / or departments and civil society. Other benefits will then often follow automatically, such as the greater range of resources, including knowledge and financial resources, through which NBS can be implemented on a larger scale, benefitting both the government and the NBS in the long term. However, the importance for accountability also increases with an increased amount of stakeholders; it is important to think in advance about extensive long-term planning and clear economic, social and / or environmental goals, which attract stakeholders in a network and which can then be pursued with all stakeholders.

However, special attention is required towards involving citizens. This is generally lacking behind in top-down governing strategies, including governing through networks. Currently, it often seems to be citizens who seek support from the government, instead of the other way around. If a (local) government would actively involve citizens into initiatives concerning the environment of citizens, this could possibly highly increase the satisfaction of citizens and thus also the legitimacy of this government institution. This could practically be achieved in multiple ways. First, by making land and resources available, citizens are able to solve problems on a very local scale, which would otherwise possibly not be recognized by a government. Moreover, there are exceptions among NBS that are governed top-down; from which other top-down governed NBS can learn: especially by involving citizens in the planning and designing phases of the NBS, for example in the form of taskforce groups with the future users of the NBS, citizens are given a sense of responsibility. In the long term, this helps to increase the appreciation and chance of success of the initiative, because future users have the best idea of what the NBS should look like and what it takes to satisfy as many involved citizens and / or local residents as possible. In addition, a municipality can act as an umbrella organization that brings together various initiatives, in order for these initiatives to share knowledge and goals and spread these similar types of initiatives further.

5.2.2. RECOMMENDATIONS FOR FURTHER RESEARCH

This research has shown that the process of mainstreaming regarding NBS in the Netherlands is still lacking behind in most cases. Introducing more networks could increase the chance of boosting this mainstreaming process. However, this more exploratory research design provides a relatively superficial but overarching view of the matter. It does not make clear to what extent (local) governments are capable of forming networks for the purpose of NBS mainstreaming or are aspiring to achieve this in the first place. Therefore, a first recommendation would be a more qualitative case study on a smaller scale. Policy documents could be very useful in this case; these indicate where the true focus of (local) governments is on. There might be reasons why networks are not used as often as they currently seem to be: what are the reasons for governments to make certain choices regarding NBS mainstreaming? What factors hold governments back? Which obstacles must be overcome first? The answer to these questions will most likely differ per municipality; they depend entirely on the context, which are not kept into account in this research.

In addition, as also concluded from this research, NBS initiatives that are self-governed (by private or civil society institutions) generally contribute least to mainstreaming these NBS. This results in a second recommendation for a more qualitative case study. When viewed from the government's perspective, the question arises how a government can reach and guide small-scaled NBS in such a way that they are more future-proof and can ultimately be implemented elsewhere, also outside of their original context. Citizen initiatives usually arise from passion; people want to motivate others and include them in their story. How can governments ensure that this can be achieved? However, as the capacity of a (local) government is limited, this question can also be proposed to the private or civil society initiators themselves; how do certain citizen / nature platforms work and how can they also better integrate NBS in their policy? How can they better share their knowledge, bring initiatives together and make the benefits of NBS better known to formulate better long-term goals?

5.3. REFLECTION

The research for this thesis has an exploratory character, looking for the underlying context of NBS; a relatively new concept that is generally implemented in a relatively small-scale manner in the urban environment. These characteristics influenced the execution of this research, which had to overcome certain obstacles and sometimes make concessions to successfully carry out this research.

First, this affected the research sample. Originally, a number of municipalities were selected that differed as much as possible in their demographic characteristics. However, especially in the relatively smaller municipalities it was difficult to identify NBS via secondary sources in the first place. This problem was less common in the relatively larger municipalities, in which the NBS were generally better documented online. That is why it was decided to only include the largest 50 municipalities in the study, and to leave out the smaller municipalities. In other words, this affected the representativeness and external validity of the research. However, attempts have been made to solve this lack of representativeness as much as possible by processing the widest possible variety of types of NBS. Thus, it was important that each municipality should preferably be represented by at least one of each type of NBS as formulated in the theoretical framework. However, there was still another shortcoming: some types of NBS were generally so small and private that they were hardly documented online. This was especially the case for green indoor areas. This type of NBS is therefore hardly represented in this research. In retrospect, this type of NBS could have been better mapped out by coming into contact with a certain organization that, for example, manages or builds this type of NBS.

These same obstacles also influenced the choice of the most suitable research method. The lack of documentation in secondary sources has meant that the pre-planned concept analysis produced very limited results. Therefore, there was no other option than to combine this method with surveys. However, these surveys have caused a slight shortcoming in the reliability of the study. First, the group of respondents is often not an expert. Although the survey is aimed as much as possible at the people involved with the most information about the NBS (in the form of initiators and / or leaders), most NBS are not led by experts. Partly because of this, the survey is sometimes not always interpreted in the same way, despite the fact that the questions for these respondents were formulated as simply and clearly as possible. In addition, NBS all turned out to be so unique in their character that it was not initially possible to generalize them for statistical analyses. To solve both problems, an additional analysis of the survey data was therefore required, in order to transform it in order for the data to be used for statistical analyses.

From the results, it could be concluded that governing through networks was the most suitable governing strategy in order to mainstream NBS. In contrast, NBS governed through societal self-governing, in which the government is no key stakeholder, did not appear to be suitable. This was caused by a shortcoming in the theoretical framework. Mainstreaming is defined as integration into government policy, aiming for new innovative ideas and activities. However, this means that mainstreaming theories have a limited vision, which is mainly focused on policy and the perspective of government stakeholders. This makes it much easier for governing strategies such as governing through networks to achieve high mainstreaming scores than more bottom-up governing strategies that have a disadvantageous position in the first place.

For myself as a researcher, in hindsight, I wish to have done more research into what I wanted, what variables I wanted to use to investigate NBS and what the most important indicators were before starting the data collection. Because the data collection was based on the European NATURVATION

project, most variables and indicators were often already fixed, but adding additional variables was still possible. However, because I did not yet know exactly what I wanted for my own research, I did not do this. As a result, I had to find out which data fit my research in what way, as well as transform the data to fit the research as much as possible. In addition, I would have liked to add extra variables to my analysis afterwards, for example any differences between large and smaller municipalities.

Overall, despite these shortcomings, I am personally satisfied with the outcome of the research and the rest of this thesis. Most of the shortcomings are due to the exploratory nature of the research. I think the NBS concept is a very interesting concept that is still developing, but has a lot of potential. This research is a good step towards the further integration of NBS in society. In retrospect, the shortcomings have been largely insurmountable. I couldn't have made many other choices; this would require different research methods and different populations.

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