TOWARDS A CLIMATE-PROOF FUTURE

A study to the contribution of adaptive visions of regional governments in the transition towards a climate-proof future.

Tessa Besselink

Master's Thesis for the Spatial Planning Programme - Cities, Water & Climate Change

Nijmegen School of Management, Radboud University

September 2021

Photo on the front page: my own picture of a stream valley in Breda, close to where I live: '*het Markdal'*

Radboud Universiteit

Provincie Noord-Brabant

Colophon

(Sub)Title	Towards a climate-proof future – a study to the contribution of adaptive visions of regional governments in the transition towards a climate-proof future
Project	Master thesis
School	Nijmegen School of Management, Radboud University
Program	Spatial Planning
Specialization	Cities, Water & Climate Change
Version	Final version
Date of submission	21-09-2021
Keywords	Adaptive visions, transitions, stream landscapes, regional government, Multi-Level Perspective, CID-template, Adaptive Capacity Wheel
Word count	± 31.000

Name author	Tessa Besselink
Student number	S1047388
Contact	tessa.besselink@hotmail.com / tessa.besselink@ru.nl

Supervisor/ 1st assessor	Kevin Raaphorst Radboud University, Nijmegen k.raaphorst@fm.ru.nl
2nd assessor	Iulian Barba Lata Radboud University, Nijmegen Iulian.barbalata@ru.nl
Supervisor internship	Frank van Lamoen Province of Noord-Brabant Fvlamoen@brabant.nl

Preface

Hereby, I present to you my master thesis: *Towards a climate-proof future – a study to the contribution of adaptive visions of regional governments in the transition towards a climate-proof future.* As it is my master project, it symbolizes the end of the master program Spatial Planning, and the end of my student life. After completing the Bachelor Built Environment in 2019, and the pre-master Spatial Planning in 2020, the master Spatial Planning with the specialization of Cities, Water & Climate Change is the last major step in my time as a student. In this last year, I gained a lot of knowledge, with this master thesis as a result. During this period, I studied multiple aspects of spatial planning and the consequences and possibilities changing climate brings. The topic of a climate robust stream landscapes as a case-study in this research contributed towards it, as it is another kind of environment than I was used to. Despite the difference, I now know that this type of landscape has impacts in the whole region and therefore, it broadens my perspective and interests.

Despite the positivity of increasing my knowledge and finishing this thesis during the last months, I cannot ignore the fact that it was also a challenging and hard period. Not only since a master thesis is already difficult, but the Covid-19 pandemic made it quite hard as well. Before I started this master, I thought I would do my research at the location of my internship organization and in that way experience the working-life. I wish it was true. Because of the pandemic, I worked from home. As I said, it was hard and challenging. Therefore, this period is not only characterized by the positivity of graduation period. It is characterized by difficult days and a lot of discipline and perseverance too. This whole process makes me even prouder to finally finish it and I am proud of the result!

Without any doubt, I was not able to finish this research without the help of multiple persons. I would like to start with thanking my supervisor from university, Kevin Raaphorst. Thank you for your feedback, advice, and the many meetings we have had. Every time, you helped me a lot and pushed me in the right direction. Secondly, I would like to thank my supervisor from my internship organization, the province of Noord-Brabant, Frank van Lamoen. Frank, thank you for your help and the use of your network. Even though we only met in person once, our online meetings helped me to keep the right focus and keep me on track, which was of great value for me.

In addition to the help I received from both supervisors, I would like to use this preface as an opportunity to thank some family and friends. First of all Annick and Justus, who else could I have asked to check my thesis than my family from the United States?! Thank you so much for all the time you putted in and your help, it was of great value as it improved my thesis a lot. Secondly, I want to thank my co-students, and especially Luke, for all their help and support, and for making my time as a student of Radboud University more pleasant. Thirdly, Eline, thank you for helping me by creating a super attractive front page. Lastly, I want to thank Thomas, Leonie, Erik, and Marjan. Where to start? You supported me, helped me, motivated me, got me back on my feet and you where there for me every single step of these past months. I would not have been able to do what I am currently doing without any of your help. Thank you so much for everything. Cheers!

Enjoy reading and remember: '*you are never too small to make a difference' – Greta Thunberg*

Tessa Besselink
Teteringen, September 2021

Abstract

Heat, drought, precipitation, and floods are felt more often and happen more intensively than ever before (Ligtvoet et al., 2015). Moreover, they are all experienced effects of the changing climate (Whitmarsh, 2009, p. 404). The consequences of the changing climate influence the social and spatial environment of society and, therefore, makes society more vulnerable (Kleerekoper et al., 2012). Within the world of climate change, methods are developed to do something about these unwanted effects. Climate change adaptation and mitigation are the most important ones, where in this study, climate change adaptation is the focus. Climate change adaptation focuses on the effects of climate change and should lead towards an increase of resilience within a specific area where such measures are taken (C40 Cities, 2016). To implement climate adaptive measures, action (policy) is needed. Within such climate action, it is argued that the local- and regional level have an important role. Both levels are close to society and objectives of national and international level should be implemented in these regions. Within this study, the regional level will be of main importance. It can be argued that the regional level offers a basis and an overarching level for locals in the field of climate change adaptation, since the changing climate does not stick to boundaries. Therefore, the regional level is often the basis for offering climate change strategies (Galarraga et al., 2011; Knieling & Filho, 2012). An example of a climate change strategy is an adaptive vision. By taking all these features together, the aim of this research seeks to study in what ways a climate adaptation vision of a regional government contributes towards greater regional adaptation goals.

To do so, the main research question of this study, which should be answered, is composed as follows: *In what ways do adaptive visions of regional governments contribute towards regional adaptation goals?* This main question is supported by several sub-questions. In addition, the questions are answered with the help of a literature review and the exploration of multiple theories. This resulted in a conceptual framework, including three theories: MLP on transitions (Geels, 2011), Adaptive Capacity Wheel (van den Brink et al., 2014) and the CID-template of climate services (Raaphorst et al., 2020), which provide an overall basis for this research. Furthermore, the data is collected via desk research, semi-structured interviews, and a focus group discussion. In turn, these methods of data collection are analysed by making use of document analysis and thematic analysis. Moreover, to collect in-depth knowledge on this subject, the study is using a case-study and a reference-study. The latter is conducted to investigate multiple national- and international adaptation visions and create a general basis of the content of such documents. The case-study of this research is the province of Noord-Brabant in the Netherlands. This province has the goal to be climate-proof by 2050 and therefore, they established a climate adaptive vision on their stream landscapes, The Guide: Towards a Climate-Robust Stream Landscape. This document and its related actions should contribute towards accomplishing the climate-proof goal (H+N+S, 2018). Ultimately, through the reference- and case-study and the validity and reliability of this study, generalizations about the subject can be made.

By taking all steps included in this research, it can be argued that there are a couple of ways to which an adaptive vision of a regional government contributes to greater adaptation goals. Firstly, this has to do with the degree to which adaptive visions direct toward the future. Adaptive visions are often part of an iterative process; they are derived from an earlier related document, and often adaptive visions are followed by multiple novelties. Because of this, the subject of visions is argued to be important and therefore, inspiring. In all, together they are aiming to contribute towards a change of the current situation and therefore, an adaptive vision is contributing towards this change by being part of the process. Secondly, by making sure the

worldview and perspective of different involved stakeholders is considered during the development of an adaptive vision, the inspirational factor of an adaptive vision is ensured. This makes sure that the vision is viewed and used. When these different perspectives are considered and involved in the document, it is ensured that the right intention and purpose of an adaptive vision is conveyed to the intended stakeholder. Finally, a way to which a regional vision contributes towards adaptation goals has to do with the extent to which it encourages and inspires to take measures and implement. It becomes clear that often an adaptive vision stays of an abstract-level and that it is not specifically directing towards change. Therefore, it is sometimes hard to take actual measures. To provide this practical basis, a regional government should take upon a collaborative leadership role to support and facilitate other involved stakeholders. Through this role it can support by providing or assisting to provide the necessary resources as well. Concluding, by considering the context of the transition, the supplies needed and the tools via which it can be communicated, the research questions could be answered.

Keywords: adaptive visions, transitions, stream landscapes, regional government, MLP-perspective, CID-template, Adaptive Capacity Wheel

Table of Contents

COLOPHON ..... **III**

PREFACE ..... **IV**

ABSTRACT ..... **V**

LIST OF FIGURES, TABLES, AND ABBREVIATIONS ..... **VIII**

CHAPTER 1: INTRODUCTION **1**

1.1. RESEARCH STATEMENT **1**
1.2. RESEARCH CASE **2**
1.3. RESEARCH AIM AND QUESTIONS **4**
1.4. RESEARCH RELEVANCE **4**
1.5 RESEARCH OUTLINE **5**

CHAPTER 2: THEORETICAL AND CONCEPTUAL FRAMEWORK **6**

2.1. THEORETICAL FRAMEWORK **6**
2.1.1. CLIMATE RESILIENCE AND ADAPTIVE CAPACITY 6
2.1.2. POLICY ACTION AND TRANSITIONS 8
2.1.3. CLIMATE CHANGE COMMUNICATION AND CLIMATE SERVICES 11
2.2. CONCEPTUAL FRAMEWORK **12**

CHAPTER 3: METHODOLOGY **14**

3.1. RESEARCH STRATEGY **14**
3.2. METHODS OF DATA COLLECTION **15**
3.3. DATA ANALYSIS **17**
3.3. VALIDITY AND RELIABILITY **19**

CHAPTER 4: RESULTS AND ANALYSIS **21**

4.1. REFERENCE-STUDY **21**
4.1.1. TRANSITIONS IN THE REFERENCE-STUDY 21
4.1.2 ADAPTIVE CAPACITY SUPPLIES IN THE REFERENCE-STUDY 21
4.1.3. COMMUNICATION TOOLS IN THE REFERENCE-STUDY 22
4.2. CASE-STUDY – SEMI-STRUCTURED INTERVIEWS **23**
4.2.1. TRANSITIONS IN THE SEMI-STRUCTURED INTERVIEWS 23
4.2.2. ADAPTIVE CAPACITY SUPPLIES IN THE SEMI-STRUCTURED INTERVIEWS 32
4.2.3. COMMUNICATION TOOLS IN THE SEMI-STRUCTURED INTERVIEWS 38
4.3. CASE-STUDY - FOCUS GROUP DISCUSSION **42**
4.3.1 STATEMENTS ABOUT THE GUIDE 43
4.3.2. STATEMENTS ABOUT OBJECTIVES 45
4.3.3. STATEMENTS ABOUT WAY OF WORKING 47

CHAPTER 5: CONCLUSIONS & RECOMMENDATIONS **49**

5.1. CONCLUSIONS 49
5.2. RECOMMENDATIONS 55
5.2.1. PRACTICAL RECOMMENDATIONS 55
5.2.2. ACADEMIC RECOMMENDATIONS 56

CHAPTER 6: DISCUSSION & CRITICAL REFLECTION 57

REFERENCE LIST 59

APPENDICES IX

List of Figures, Tables, and Abbreviations

Figures

Figure 1 = Screenshot of a page within The Guide (H+N+S, 2018)
Figure 2 = The Adaptive Capacity Wheel (van den Brink et al., 2014)
Figure 3 = Multi-Level Perspective on transitions (Geels, 2011)
Figure 4 = CID-template (Raaphorst et al., 2020)
Figure 5 = Conceptual model
Figure 6 = Code-scheme conducted from Atlas.ti
Figure 7 = Visualization of different steps and parts in the research

Tables

Table 1 = Explanation of the six dimensions of the Adaptive Capacity Wheel
Table 2 = Clarification of legal responsibility of government organizations in The Netherlands
Table 3 = Document-list of used documents in the reference-study
Table 4 = Interviewee-list semi-structured interviews
Table 5 = Participant-list focus group discussion
Table 6 = Description novelties
Table 7 = Description involved stakeholders in The Guide

Abbreviations

The Guide = Case-vision of the province of Noord-Brabant, The Guide: Towards a climate robust stream landscape
MLP = Multi-Level Perspective on transitions to sustainability (Geels, 2011)
CID = Climate Information Design-template (Raaphorst et al., 2020)
KLIMAP = 'Klimaat Adatation in de Praktijk', climate adaptation in practice
KRW = 'Kaderrichtlijn Water', Water Framework Directive
GGA = 'Gebiedsgerichte aanpak', area-oriented approach

Chapter 1: Introduction

The introduction: the start of this report. This chapter aims to introduce the central research topic by elaborating on the research statement, case-study, research aim and questions, the research relevance, and the overall research outline.

1.1. Research Statement

Awareness, recognition, and action in the field of environmental issues and climate change are based on a couple of milestones in history. One could think about the Limits to Growth report of the Club of Rome (1972), the establishment of the Intergovernmental Panel on Climate Change by the United Nations (1988), the signing of the Kyoto protocol (1997) or the entry into force of the Paris Agreement (2015) (Colombo, 2001; Agrawala, 1998; O'Neill & Oppenheimer, 2002; Savaresi, 2016). Since these major milestones in the history of climate change, things have changed: climate change has become a topic which is high on the political agenda and the public awareness increases each day. The IPCC has defined climate change as ''*current or projected changes in climate whether due to natural variability or to human activities''* (Whitmarsh, 2009, p. 404). The changing climate is causing various consequences, for example the increasing appearance of extreme precipitation, a decrease of cold (winter) days, increase of tropical nights in summer (heatwaves), increase of drought and rising sea level. These effects of climate change can be extreme or gradually noticeable. It depends per region to what extent climate change is felt as well (Ligtvoet et al., 2015; Cannon & Müller-Mahn, 2010).

Because of this, climate change is seen a multiplier of threat. It has the potential to worsen humanity's biggest challenges such as health, inequalities, and ecosystem preservation among many others (Zhenmin & Espinosa, 2019). In all, climate change influences the social and spatial environment of society and therefore, makes society more vulnerable (Kleerekoper et al., 2012; Cannon & Müller-Mahn, 2010). To reduce the undesirable consequences of climate change, two methods come to focus: climate adaptation and climate mitigation. Both methods aim to reduce the risks of negative climate change effects, where mitigation focuses on the source of climate change while adaptation focuses on the effects of climate change (Swart & Raes, 2007; C40 Cities, 2016). Hence, by reducing the effects and the vulnerabilities through climate change adaptation or mitigation, areas will become increasingly resilient. Climate change resilience can be defined as the degree to which human action makes it possible for a social-ecological system to survive or revise (Cannon & Müller-Mahn, 2010). As a result, there is a need for decisive climate action regarding mitigation and adaptation to improve society's resilience to climate change (Galarraga et al., 2011; Knieling & Filho, 2012). Within climate action, it is argued that regional and local governments play an important role in the design and implementation of climate-change policy. Particularly, agreements on international level will eventually be notable at the regional or local level (Galarraga et al., 2011). Moreover, since the local level is closest to its citizens, it is of importance that they have close contact with stakeholders. In addition to the local level, climate change adaptation mostly takes place in an overlying regional level. Therefore, the regional level provides a basis for the implementation of adaptation strategies (Knieling & Filho, 2012). Thus, without the efforts of regional and local governments, success and effective implementation of climate action is not guaranteed (Galarraga et al., 2011).

In view of climate action and the government organizations that should play a role in the climate challenge, different related objectives are stated within governmental documents. For instance, the Dutch National Environmental Vision (NOVI) states that all cities and regions should be climate-proof and water-resistant by 2050. In addition, decentralized governments produce locally focused climate adaptive actions to accomplish broad objectives (NOVI, 2020). As such, regional and local governments have a specific climate change strategy focused on their own area (Keessen et al., 2013). Hence, a governmental document, regional or local, can introduce and publish adaptive action. However, when thinking about the importance of regional or local governments in successful national and international climate action implementation, it begs the question what a specific climate-related document of such governments contributes towards these greater adaptation strategies.

1.2. Research Case

An example of a governmental document related to climate change adaptation established by a regional government is The Guide: Towards a Climate-Robust Stream Landscape (‘*Reisgids: Op weg naar klimaatrobuuste beeklandschappen’)*, of the province of Noord-Brabant of the Netherlands. Accordingly, this province and this adaptive document will function as a case-study in this research. This document is based on their Environmental Vision (‘*Omgevingsvisie’)* which was established in 2018. In this vision, the future living environment of the province is the focus and regarding climate change, the concept of climate-proof is of importance. In their vision, the province of Noord-Brabant states that their goal is to be climate-proof by 2050, according to the same objective as the National Environmental Vision (NOVI, 2020; Provincie Noord-Brabant, 2018). In addition, the provincial-vision states that 80% of the land in the province consists of a combination of sand-soil and streams. Together, these two ground-types form the stream landscapes of the province (Provincie Noord-Brabant, 2018). This specific landscape includes the lower stream, its valley, the adjacent flanks, and higher sandy soils. It becomes clear that this landscape is under pressure because of the changing climate. Currently, water is carried away out of the area as quickly as possible, to prevent the area from flooding. However, because of climate extremes, this causes problems in areas where water is taken out too quickly which results in drought. Floods are a danger because of extreme precipitation as well (H+N+S, 2018). To be able to persist the effects of the changing climate and to accomplish the goal of becoming climate-proof in 2050, it is argued that the stream landscapes in Noord-Brabant are of great importance, and therefore, they should be redesigned. Regarding these objectives, the province of Noord-Brabant developed The Guide, which was published in 2018 and considers a form of an adaptive vision (Provincie Noord-Brabant, 2018). According to Wiek & Iwaniec (2013), an adaptive vision is a document which consists of a glimpse to a desired future by describing scenarios and as such, it contributes towards stating and in the end accomplishing objectives.

The Guide is created through a collaboration of the province and different involved water authorities. The Guide describes future climate-proof perspectives of the stream landscape: the landscape as a structural support and opportunity for the province of Noord-Brabant. The stream landscape should retain water, which increases the sponge effect of the landscape and is beneficial to resist the effects of climate change. Moreover, it is argued that this guide should be the start of a transition towards the desired goal. It should be the start of change, and it should be an invitation for the different stakeholders involved to contribute towards this transition. Entrepreneurs, farmers, municipalities, and residents are specific stakeholders mentioned within the Guide, and who are invited to join this transition. It can be seen as a

vision document for the province (H+N+S, 2-018). The actual content of the vision can be described as follows:

- Introduction: includes the origin of the document and clarification of the stream landscapes. Besides, the methods of approaching the challenge are clarified.
- Different perspectives: includes the historic, current, and the future perspectives of the stream landscapes of Brabant in maps and short notes. Figure 1 visualizes this part.
- Future perspective: clarified more broadly, and this includes the appointment of multiple perspectives. For instance*: 'broaden the water- and nature task to a climate-task and use this as an engine for working on improving the integrated environmental quality of the living environment'* (H+N+S, 2018, p.4).
- Clarification of three pilot-projects: The Guide is developed based on three pilot-project which consists of a stream landscape in west-, middle-, and northeast Brabant. Furthermore, each of the pilot-projects are explained individually. Within this explanation, each project individually answers questions of what a stream landscape is and how it should look in the future for the specific case-area.
- Opportunities and bottlenecks: what follows are an enumeration of opportunities and bottlenecks which arises from the case-studies. For instance: *'prevent desiccation where possible and increase the sponge effect 'nature as water buffer'* or *'using stream valleys as natural connecting zone'* (H+N+S, 2018, p.9).
- Finally, the conclusion and what should be done next. This last part includes a conclusion of the whole document and some abstract assumptions. For instance: *'it is necessary for one party to take control to get an area process off the ground. For the success of the area processes, it is very important that there is commitment from the participating parties, and that good agreements are made about who will take the lead'* (H+N+S, 2018, p. 10).

In all, The Guide can be seen as an interim summary of the results of the pilot-projects, and it visualizes what the landscape should look by 2050 (H+N+S, 2018).

An adaptive vision, such as The Guide, is a governmental vision to accomplish overarching climate objectives, such as becoming climate-proof by 2050 by the province of Noord-Brabant (Provincie Noord-Brabant, 2018). To be able to accomplish the objectives within The Guide, the right steps should be taken. Hence, it should be made clear whether the current steps of such adaptive vision are as effective and usable as intended. Does it contribute towards bigger objectives? Once this contribution is clarified, it becomes clear whether the objective can be reached and what possible interventions or adjustments should be made to accomplish the objective.

Figure 1: Screenshot of a page within The Guide. Translation: 'From a historical landscape towards a future perspective – stream landscape of circa 1850, the current stream landscape, and the future perspective of the stream landscape (H+N+S, 2018)

1.3. Research Aim and Questions

Based on the research statement and case-study, the aim of this research is to study in what ways adaptive visions of regional governments contribute towards regional adaptation goals. Within this research, the province of Noord-Brabant of the Netherlands and The Guide will function as a case-study. By doing so, recommendations about the future role and actions of the province in view of the case-study could be given.

Following from this research aim, the main question can be asked as: '*In what ways do adaptive visions of regional governments contribute towards regional adaptation goals?'*

To answer this main question, different sub questions have been formulated:

1. What type of climate data and procedural knowledge do adaptive visions contain?
2. What stakeholders are involved in the process and development of adaptive visions?
3. How useful is the adaptive vision 'The Guide: Towards a Climate-Robust Stream Landscape' for local involved stakeholders?
4. What are important aspects that the province of Noord-Brabant should consider in the future, when using an adaptive vision?

1.4. Research Relevance

The societal relevance of research is about its contribution toward societal issues or policy questions (van Thiel, 2017*)*. In this research, its relevance can be found in the increasing attention and action on climate change (Keessen et al., 2013). This sense of importance and urgence is accurate: drought, heat, flood, and sea level rising are just four critical effects of climate change but there are many more. Action against climate change in the form of climate adaptation or climate-proofing certain areas is an important part of protecting society against it (C40 Cities, 2016). Through policy documents, visions and strategies, government organizations on all levels make sure that climate action is incorporated into policy and have a clear goal (Keessen et al., 2013). An example is The Guide of the Province of Noord-Brabant (H+N+S, 2018). The aim of this research enables the possibility to give recommendations to the province, about their role and actions in view of The Guide. These recommendations have similar characteristics to an interim evaluation. Bachtler and Michie (1997) argue that such an interim evaluation is of importance, as it provides the possibility to influence the way to move forwards through improvements. Through recommendations and action, the province can become a climate-proof province. In the end, this is beneficial for society since it will be less vulnerable to the changing climate.

Another factor contributing to the societal relevance of this research is the contribution it makes for raising awareness on the effects of climate change, and the importance of stream landscapes within this major challenge. Only very recently, in July 2021, rivers and streams in the province of Limburg (located in the South of the Netherlands) rose to such a high level that the surrounding areas experienced heavy flooding. During the floods in Limburg, the normally gently flowing streams turned into raging rivers that overflowed their banks. This was caused by extraordinary precipitation in Germany, Belgium, and Limburg, and this in turn caused enormous damage. Flooded streets and houses, and junk displaced among nature are only a couple of examples of the damage that occurred ('t Hart, 2021; NOS, 2021). The situation in Limburg made the importance of climate-robust stream landscapes clear, and it showed what can happen if not enough action is taken as well. Since this research focusses on climate-proofing the stream landscapes of the province of Noord-Brabant as a case-study, a link to the

floods in Limburg can be made. By studying the stream landscapes of Noord-Brabant and how to make them climate-robust, knowledge will be gathered and, therefore, awareness on this topic will increase. Therefore, the event in Limburg shows, again, the societal relevance of this study.

Besides societal relevance, this research is relevant from a scientific perspective as well. The scientific relevance of a research is about the extent to which research contributes to and enlarges the existing scientific knowledge of the topic (van Thiel, 2014). The knowledge that will be generated through this study is about the ways in which a climate-proof or adaptive vision-document contributes toward a climate-proof future. As such, it is a contribution to the scientific world since it assesses a form of a climate service, partly based on the article of Raaphorst et al. (2020). Raaphorst et al. (2020) argues that a climate service is a tool to offer information about climate change, its impacts, and possible solutions. When comparing it to The Guide, multiple similarities are identified. In view of this article, this research can be seen as an elaboration and provides an enlargement on existing scientific knowledge. Moreover, by using a case-study, this research will generate an in-depth level of knowledge on the topic. In this way, theories will be tested in practice and therefore enable the possibility to evaluate the level of accuracy of theories that will be explored.

1.5 Research Outline

This research starts with the introduction. This chapter includes the cause of the research, an explanation of the case-study, the clarification of the research aim and objectives, and finally a justification of the societal and scientific relevance of the study. Furthermore, the theoretical and conceptual framework are described in chapter two. In this chapter, an elaboration of the theories used in this study is provided and supported by a literature review. Additionally, in chapter three is the methodology described. In this chapter, the research paradigm, the strategy, the used methods and analysis and the validity and reliability of this study are argued. Based on these chapters, it was able to conduct the research. The results and analysis of it are described in chapter 4, based on the reference-study, the semi-structured interviews, and the focus group discussion. Chapter 5 describes the conclusions and recommendations, and therefore, this chapter provides answers to research questions. Finally, the last chapter included the discussion and critical reflection. Overall, this described the research outline.

Chapter 2: Theoretical and Conceptual Framework

In this chapter, the theoretical framework will be based on the concepts mentioned in the research statement and questions. The topics in this theoretical framework will be supported by some literature review in combination with corresponding theories. As a result, a conceptual framework is established which entails the transition from the theoretical concepts to empirical research (van Thiel, 2014).

2.1. Theoretical framework

2.1.1. Climate Resilience and Adaptive Capacity

Because climate change negatively affects our society (Kleerekoper et al., 2012), climate change mitigation and adaptation measures are used to reduce the risks of these negative effects. Climate change mitigation aims to reduce the climate change effects by tackling the source, which has to do with greenhouse gas emissions (Swart & Raes, 2007). The C40 Cities defines climate change adaptation as '*'a process of adjustment to actual or expected climate change and its effects, leading to increased resilience of areas''* (C40 Cities, 2016, p. 4). Van Drunen, Leusink & Lasage (2009) argue in their article that despite there is being a major reduction in greenhouse gas emissions through mitigation, climate change cannot totally be prevented. Because of this, adaptation to climate change is necessary to make the effects of it acceptable (Raaphorst et al., 2020). Furthermore, through climate change adaptation measures, an area can be made climate-proof. Climate-proof is a measure wherein an eco-, socio-economic- or technological system continues to function normal even though negative consequences of climate change occur (van Drunen et al., 2009; Cannon & Müller-Mahn, 2010)). By adding climate-proofing measures in development, this can result in an improvement of the resilience or adaptive capacity of the development (Knieling & Filho, 2012). Adaptive capacity is defined as '*'the ability of a system to adjust to climate change to moderate potential damages, to take advantage of opportunities, or to cope with the consequences''* (Gupta et al., 2010, p. 461). It is part of the characteristics of institutions. It is a characteristic that empowers actors to respond to short and long-term climate impacts. Because of climate change and the need to climate-proof an area, institutions need to be able to adapt to the challenge of incorporating newly obtained information and should become more progressive and proactive in coping with the impacts of the changing climate. In short, the changing climate and its consequences calls for institutions that enhance the adaptive capacity of society (Gupta et al., 2010; Van den Brink et al., 2014). Because of this, the Adaptive Capacity Wheel (figure 2) was designed, which is a tool used to assess the adaptive capacity of an institution.

The Adaptive Capacity Wheel is composed of three circles, in which the adaptive capacity is the inner circle, the dimension of adaptive capacity is the middle circle, and the multiple indicators of these dimensions are within the outer circle (Figure 2). The six dimensions are variety, learning, room for autonomous change, leadership, resources, fair governance, and these dimensions are defined in Table 1 (Van den Brink et al., 2014; Gupta et al., 2010). Besides the Wheel, the framework includes a scoring scheme to analyse the elements of the Wheel as well. However, it is argued that only the Adaptive Capacity Wheel gives already a proper informative insight into the dimensions and their indicators of the adaptive capacity of an institution. As concluded in van den Brink et al. (2014), to climate-proof an area and in turn increase its resilience, a high adaptive capacity is necessary. It is therefore argued that this

Wheel alone with its dimensions and indicators contributes to this research as it provides a foundation of knowledge to study the climate resilience of an institution.

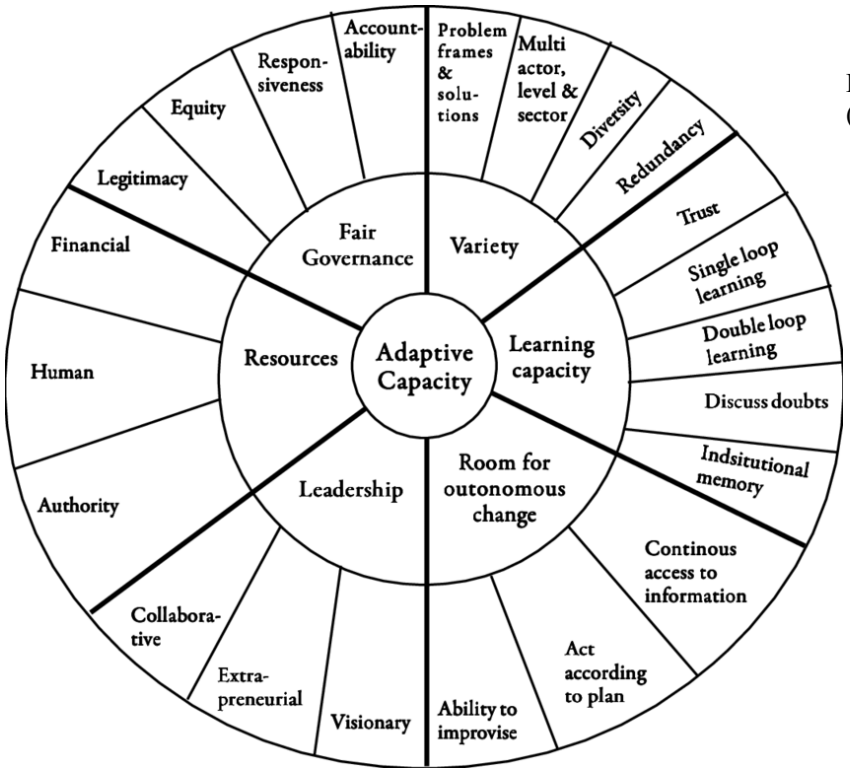


Figure 2: The Adaptive Capacity Wheel (van den Brink et al., 2014)

Dimension	Explanation
Variety	''Institutions should allow for and encourage variety, that is, incorporate different actors, sectors and administrative levels during policy making and implementation; promote a differentiation of adaptation strategies; allow for the involvement of different problem definitions and solution frames; and create redundancy, that is 'more of the same'' (van den Brink et al., 2014, p. 983)
Learning	''Climate issue is a relatively new issue… This calls for institutions that enhance learning and above all reduce the mechanisms that inhibit learning. Institutions should stimulate actors to trust each other, exchange their problem frames and together make sense of the issue at stake, while at the same time discussing doubts. Actors also should be stimulated to scrutinise their underlying assumptions in thoughts and behaviour and engage in single-loop learning and double-loop learning. Finally, institutions should promote the monitoring and evaluation of policy experiences, that is, the creation and preservation of an institutional memory'' (van den Brink et al., 2014, p. 983-394).
Room for autonomous change	''Institutions should enable actors to anticipate possible futures, to self-organise preventive measures and to seize opportunities when they present themselves. Institutions should permit actors to adjust their behaviour explicitly or implicitly in response to environmental change'' (van den Brink et al., 2014, p. 984).
Leadership	''Leadership is a driver for change, showing a direction towards a society with a high adaptive capacity. This calls for institutions that stimulate three types of leadership, each emphasising a different aspect of leadership'' (van den Brink et al., 2014, p. 984). Types of leadership: visionary leadership, entrepreneurial leadership and collaborative leadership.
Resources	''For adaptation efforts to succeed, it is crucial that institutions enable actors to generate and mobilise sufficient resources. Financial resources are required to experiment with and implement adaptation strategies; human resources are required to develop these adaptive strategies; and authority is required to take and implement the necessary decisions (van den Brink et al., 2014, p. 984)
Fair governance	''Fair governance processes provide responsive and accountable policy making and implementation, protect basic rights and equity and, through constitutional laws, promote legitimate policy processes'' (van den Brink et al., 2014, p. 984)

Table 1: Explanation six dimensions of Adaptive Capacity Wheel. Own table: information obtained from van den Brink et al., (2014)

2.1.2. Policy Action and Transitions

Because the changing climate influences a wide range of stakeholders, spheres of activity and interests, policy action is needed and this should be implemented at different levels: from global to local (Knieling & Filho, 2012; Galarraga et al., 2011). In their article about policy formulation and implementation of sustainable urban development, El Asmar, Obohon & Taki (2012) are contributing to this by citing John Donne (1572-1631):

''...no man is an island, entire of itself; every man is a piece of the continent, a part of the main'' (p. 37).

This quote underlines the importance of collaboration and interdependence in the field of climate change. This interwoven process of multiple levels and structures in view of climate change and climate policy leads to the multi-level governance within the climate crisis. This type of governance is defined as the vertical and horizontal (multiple levels and multiple actors) dispersion of governmental authority (Galarraga et al., 2011; Bache et al., 2016). Not only are governmental actors involved in such a governance type; private actors, business, and civil society are as well (Knieling & Filho, 2012; Steurer, 2013).

As a governmental institution, there are multiple possibilities in the process and implementation of climate change policy. This has to do with the kind of instruments a government can use within this challenge to realize the goals of climate policies. Because of the multi-level characteristic of climate change, climate policy instruments can be grouped in three instrument types, so that each level, discipline, or actor, has an instrument to use.

- Firstly, formal instruments, which include hierarchical and statutory forms of regulation. For instance, this could be regional development plans or zoning plans. This instrument is a contribution towards the top-down process of implementation. These processes are initiated by government organizations and projected over others; participation of stakeholders only takes place very limited (Cooksey & Kikula, 2005; Knieling & Filho, 2012).
- Secondly, economic instruments, which are financial or competitive forms of regulations. Economic instruments influence or affect the behavior of actors to be more climate friendly, for instance, land use taxes or incentive systems. This instrument can be used in both top-down or bottom-up processes of implementation. The bottom-up process can be explained as a form where governmental organizations collaborate with other stakeholders to address problems of local interest (Cooksey & Kikula, 2005; El Alsmar et al., 2012; Knieling & Filho, 2012).
- Lastly, informal instruments, which contribute towards raising awareness, mobilizing actors, and contributing towards the improvement of understanding the problem and the communication between actors. Examples of informal instruments include development concepts or scenarios, visions, adaptation programs or climate proofing. This instrument is a contribution towards the bottom-up process of implementation (Knieling & Filho, 2012).

The extent to which a governmental institution uses an instrument to contribute to the implementation of climate change policy, has to do with the legal responsibility a specific level of government has as well. For instance, a municipality is closely involved with local projects, however it has less to do with national objectives compared to a regional government. Table 2 clarifies the legal responsibility of different levels of government. Within the table, solely the legal responsibilities of Dutch governmental organizations are stated since the case-study in this research is involving Dutch governments.

Governmental organization	Legal responsibility
National government	The central government in the Netherlands has the legal responsibility to develop policy, enacts laws, and monitors compliance. Accordingly, this also involved the topic of climate change and adaption (Rijksoverheid, 2021a).
Province	Provinces in the Netherlands has multiple legal responsibilities. To start, the province has the responsibility to monitor municipalities and waterboards, as they are responsible to monitor the compliance of environmental laws. Furthermore, the province also creates nature and protects existing nature (Rijksoverheid, 2021b). Within the area of water management, the province has the responsibility to translate national water policy into regional measures (Rijksoverheid, 2021e).
Municipality	Municipalities in the Netherlands also have multiple legal responsibilities and they have often to do with the direct interest of the residents of a municipality. Responsibilities of a municipality are zoning plans, which solely include multiple spatial instruments, supervision of housing construction, builds infrastructure, implements the Environmental law, facilitates in financial support (Rijksoverheid, 2021c). Finally, a municipality is responsible for ground water within urban area, as they are responsible for the drainage of waste- and rainwater (Rijksoverheid, 2021e).
Waterboards	Together with 'Rijkswaterstaat', the waterboards are the water managers of the Netherlands. Where Rijkswaterstaat is responsible for the bigger waters (sea and rivers), waterboards are responsible for regional waters. Such waters include canals. As such, they are responsible for enough and clean water, and they protect the country against floods. Besides, they also make sure that the agricultural sector does not have to deal with water scarcity. In addition, waterboards are responsible for wastewater purification, and for the nature management in and by the water. Finally, they are responsible for developing management plans for water quality (Rijksoverheid, 2021d; Rijksoverheid, 2021e).

Table 2: Clarification of the legal responsibility of a governmental organization

Furthermore, by transforming an area into a climate-resilient version, effective action towards the objective is needed. When thinking about the action towards the desired status, the concept of transitions comes to mind. Transitions are processes of structural change in the main societal subsystems, and they involve a shift in the dominant rules of the game (Meadowcroft, 2009). The Multi-Level Perspective on transitions to sustainability (in short: MLP) of Geels (2011) offers a helpful framework, which analyses socio-technical transitions to sustainability. Addressing problems such as climate change, requires an extreme improvement in the environmental performance of society. These improvements can only be generated through a deep-structured change in major systems such as energy, agri-food, or transport. These changes in big systems are called socio-technical transitions and are complex, long-term and comprise multiple actors. In MLP, transitions are non-linear and are the result of an interplay of developments at three analytical levels. Firstly, the niche-innovations, this is a protected space where users have special demands and are willing to support emerging innovations. These innovations are different from the current mainstream. Niche-actors are hoping that their innovation through novelties will eventually replace the mainstream. Novelties are the emerging projects or steps from the niche-innovation. Niches are crucial for transitions since they provide the basis for systemic change and are the start of new novelties. Secondly, socio-technical regimes, which contains the deep structure of a socio-technical system. It can be seen as the set of rules that coordinate activities and behaviour of social groups that reproduce the elements of the socio-technical system. Overall, this level originates from lock-inns or so-called path dependencies: decisions in the past are the basis of and are influencing current actions and behaviour. Lastly, the socio-technical landscape. This is the wider context and

highlights technical- material backdrops and demography trends, political ideologies, societal values, and other patterns (Geels, 2011).

Accordingly, the socio-technical regimes are of main importance since transitions are defined as a change from one regime to another. The niche-level is a deviation of practices or technologies from the regime-level. In turn, the landscape-level is more of an external environment that influences interactions. In Figure 3, the MLP-perspective is visualized, which shows that one could argue that the regime-level could be changed through a niche-innovation, to transform the landscape-level. Moreover, the current regime-level is damaging the landscape-level and therefore, the landscape-level is putting pressure on the regime-level to change towards an improved version. However, the seeds of change originate from the niche-level. This level can influence the regime-level through small adjustments, through which continuous learning processes can take place, and through which different actors can be mobilized to work together on the innovation. Furthermore, through novelties within this niche-level, eventually elements should be aligned, and this will lead towards a trend which evokes change in the regime-level (Geels, 2011)

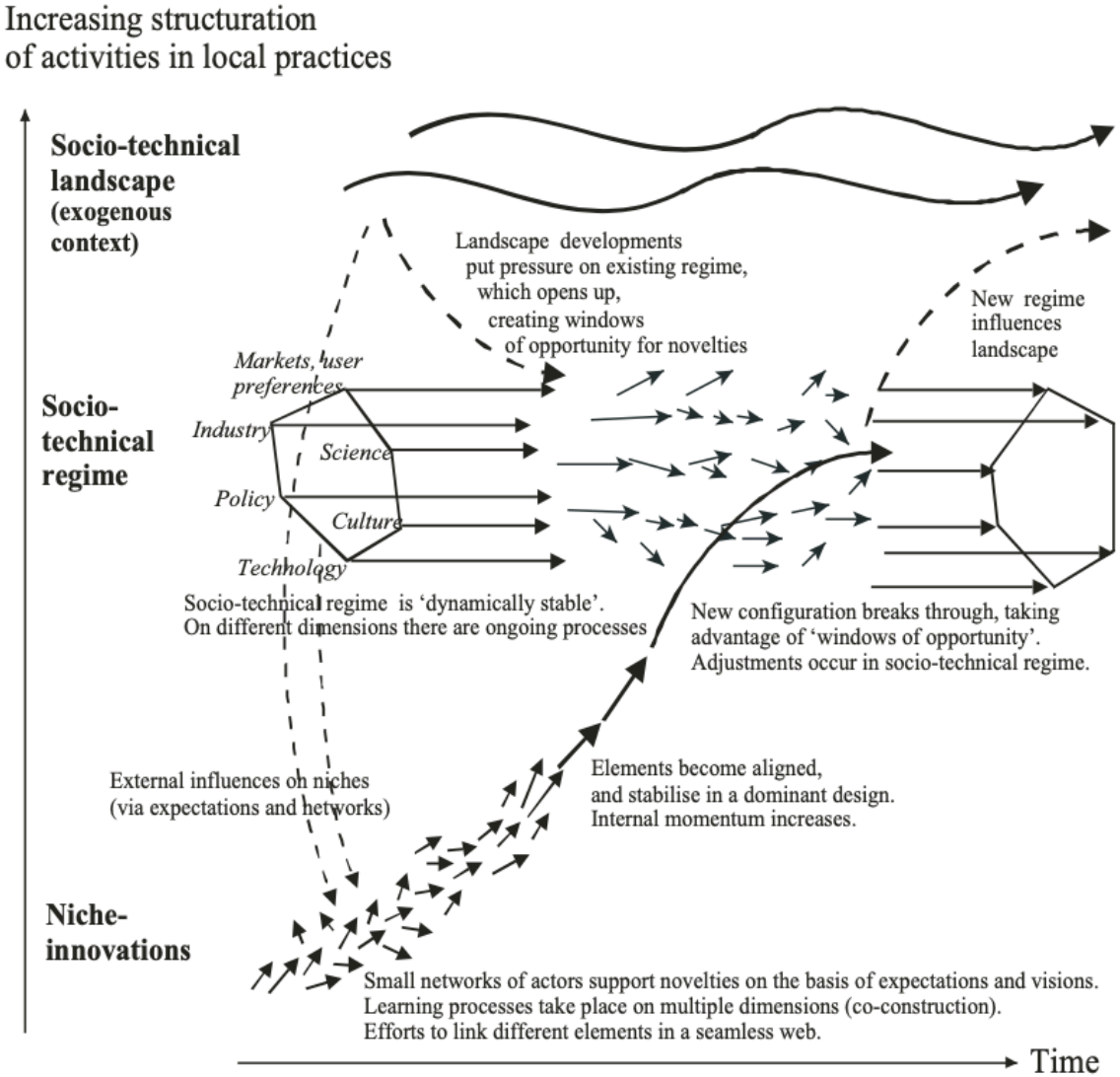


Figure 3: Multi-Level Perspective on transitions (Geels, 2011)

2.1.3. Climate Change Communication and Climate Services

Besides features on the transition and the extent an area or institution can increase its climate resilience, climate communication comes to focus. Within climate adaptation, behavioural change, and the development of sustainable solutions within different layers and sectors is required. To describe and predict the changing climate and therefore, stimulate such developments and change, climate communication is a feature what should support this (Chadwick, 2017). Moreover, it is clarified that climate communication is of interest to increase the public engagement within the challenge (Moser, 2010).

Within this perspective, the notion of climate services is come to focus. It is argued that an adaptive vision is a form of a climate service. A climate service is a communication tool within the context of planning processes for climate adaptation and it can encompass different forms. To prevent miscommunication in a climate service, an analytical framework is established: the Climate Information Design (CID) template (figure 4). The CID-template consists of four categories. Firstly, the interpretation by the intended audience of the climate service (stakeholder). Secondly, the framing and purpose of the message the climate service is intended (information purpose). Thirdly, the information included in the climate service (information). Lastly, the choice of expression and medium of presentation of the climate service (visual format) (Raaphorst et al., 2020).

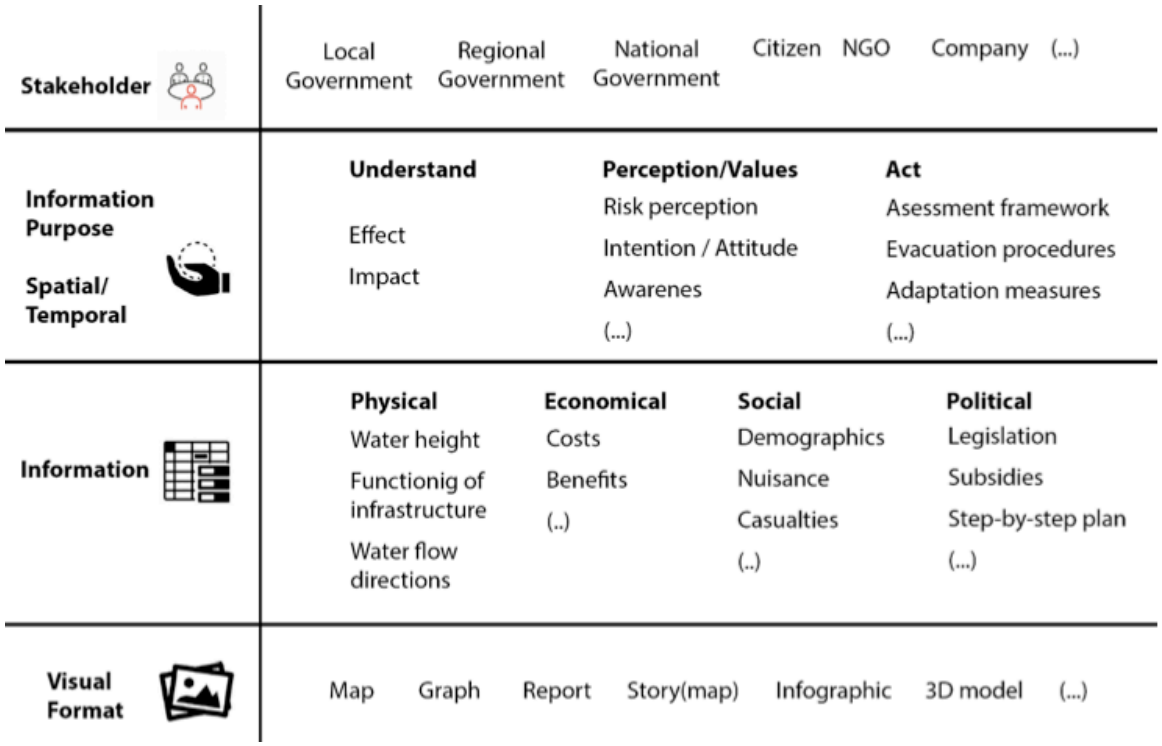


Figure 4: CID-template, including several examples per category, as an analytical tool to prevent climate services to be miscommunicated (Raaphorst et al., 2020)

In short, the template as a communication tool includes categories to serve as a checklist and prevents miscommunication of such tools. It makes sure that questions as: 'who is the audience, what is the purpose, which information is included and how does it look like?' have been taken away and answered in a climate service (Raaphorst et al., 2020).

2.2. Conceptual Framework

The conceptual model of this research is visualized in Figure 5. In the model, the MLP of Geels (2011) is adjusted towards this research, as are the Adaptive Capacity Wheel of van den Brink et al. (2014) and the CID-template of Raaphorst et al. (2020). To start, the context of this study is focusing on the transition towards a climate-proof future through adaptive visions. The MLP on transitions formulates the context of this study. In addition, an adaptive vision is argued to be a form of a niche-innovation. When viewing this over the case-study, it can be explained that The Guide establishes a start towards climate-proofing the stream landscapes and should contribute towards the bigger objective of the province to be totally climate-proof by 2050. The total climate-proof status can be seen as the desired regime-level, wherefore the current regime needs to change. Furthermore, this change is established through multiple novelties which can be described as new projects or new ways of working.

To realize this transition, supplies are necessary. Within this category, the Adaptive Capacity Wheel of van den Brink et al. (2014) is used. The desired supplies to reach a climate-resilient future are part of this framework, in the form of dimensions. Besides van den Brink et al. (2014), Gupta et al. (2010) is clarifying the dimensions of the Adaptive Capacity Wheel in his article too. Therefore, the contribution of this framework in this research comes from both articles. First, the dimension of learning with its corresponding indicators enables one to know how the desired state should look and what change is necessary to accomplish that (single- and double loop learning and discuss doubts). In addition, the dimension of leadership and its specific indicators of visionary-, entrepreneurial- and collaborative leadership contributes towards this research as well. By giving a right example, bridge gaps, and just act, an organization can support a society to act. By detecting this dimension, the right example towards the future can be unravelled. Finally, the dimension of resources and its corresponding indicators contribute towards this research too. By detecting the demanded resources, it becomes clear what is necessarily needed to accomplish the objective of being climate-proof by 2050. For example, financial or human resources. In total, these three dimensions of the Adaptive Capacity Wheel are forming the basis to study the necessary supplies within this research.

To communicate a transition with its supplies, tools are needed and therefore, climate services and the CID-template of Raaphorst et al. (2020) are used. The definition of climate services and the aim of The Guide are of accordance; communicating the changing climate, its impacts, adaptation measures towards stakeholders to raise awareness, create understanding and make decisions. Because of this, an adaptive vision should be in accordance with the CID-template too, because this will prevent such visions to be misunderstood or miscommunicated. Therefore, the indicators of stakeholders, purpose, information, and visualization will be elaborated in this study. Using this CID-template during the transition towards the new regime, it will serve as the communicative tool to get to the desired end-state.

In total, the cause of this research lies in the appearance of the phenomenon of climate change. Because of its effects, a transition is needed to prevent society against it. This transition should contain supplies which provide an increase of the ability to adapt to climate change of an area. To be able to transfer such supplies, tools are needed to be sure that they are communicated in the right way. All of it together (context, supplies and tools) should lead towards the end-goal of being climate-proof. Through the MLP, the CID-template, and the Adaptive Capacity Wheel, this study is investigating adaptive visions to clarify their contribution towards the climate-proof goal. In short, this explains the conceptual model visualized in Figure 5.

Moreover, these theories enable answering the main question and the four sub-questions of this research by elaborating the theories as the context, supplies and tools of a climate-proof future. Accordingly, not a specific theory is directed towards one sub-question: there will be overlap. For instance, to communicate an adaptive vision in the desired way, the right information should be provided within the document. The indicator of information enables the possibility to identify which information or knowledge an adaptive vision entails. It can be argued that the indicator of learning as a supply to enable the transition is aiming for contributes towards it as well. Therefore, an overlap can be identified where both theories contribute to clarifying a part of the research questions.

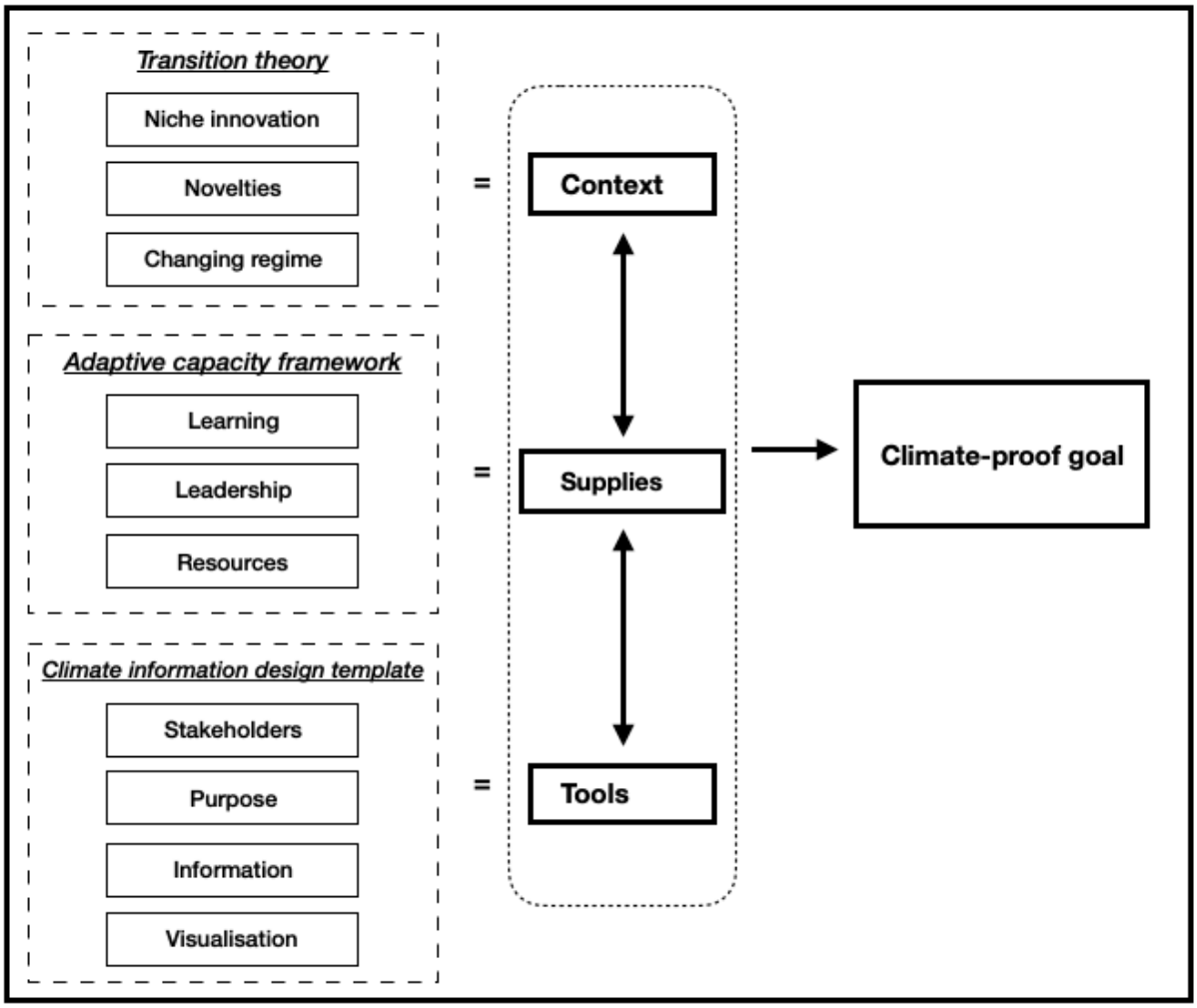


Figure 5: Conceptual model (own figure)

Chapter 3: Methodology

In this chapter, the methodology as the foundation of this research is elaborated. The research strategy, the methods of data collection, the methods of analysis and the validity and reliability of this research are described.

3.1. Research strategy

Van Thiel (2014) clarifies that a research strategy provides the overall design of a research, and that the chosen methods of research are based on it. Part of the research strategy is the research paradigm that has been applied in research. The paradigm in this research is the interpretative approach, which assumes that truth and reality are created and not discovered. Thus, the reality cannot be directly accessed by the observer without the observer being influenced by his or her worldview, concepts, and backgrounds (Rehman & Alharti, 2016; van Thiel, 2014). This paradigm is fitting in that it provides a basis to include different perspectives on the contribution of adaptive visions towards greater regional strategies. These different perspectives are of interest since it becomes clear that multiple stakeholder groups are involved in an adaptive vision. The Guide involves local stakeholders, municipalities, water authorities and the province. Through this paradigm, it was possible to explore the different perspectives of all involved and include the knowledge conducted from them in the research.

The interpretative approach of research can be both inductive and deductive of character (van Thiel, 2014). Within this research, both characters are reflected and used. The deductive character can be explained since this research has made use of existing theories which in turn were spread over research. The used theories are explained in the theoretical framework and were the MLP, CID-template and the Adaptive Capacity Wheel. Moreover, the research is inductive since it resulted in axioms. The axioms were provided by producing general statements in the conclusions, based on the results (van Thiel, 2014). In addition, the research is divided into two parts. The first part in this research is a reference study to obtain information about adaptive visions in general, based on the investigating multiple adaptive documents. The second part consists of a case-study in which The Guide was studied in detail. Both parts took place next to each other during the study and complemented each other.

The case-study makes up the largest part of the research, which is why it mostly determined the research strategy. A case-study is 'an empirical in-depth inquiry about an individual, family or organization' (Fridlund, 1997, p.3). In a case-study, a phenomenon will be investigated in its real-life context, and it aims to develop or test a theory (Fridlund, 1997). A case-study has been chosen because it assists to explore, explain, describe, evaluate, and theorize complex issues in context. By making use of the case-study, an in-depth understanding of processes and practices is obtained (Harrison et al., 2017). Within this research, the case-study has been applied to get an in-depth view of an adaptive vision. It resulted in the possibility to develop statements about what ways a regional adaptive vision contributes towards regional goals. The case-study in this research explored one vision in detail, The Guide. Therefore, it was a single case-study with the aim to explore (Gustafsson, 2017).

The exploration-aim corresponds to the rest of the research as well. According to the article of van Thiel (2014), exploration research aims to investigate a subject where little knowledge is available of and its questions often start with '*in what ways do…'*. Moreover, this article clarifies that an explorative research question contributes to the paradigm of exploring how different actors assign meaning to the specific case. Since this research conducted multiple

interviews with government- and non-government organizations to obtain knowledge of The Guide about the ways it contributes to regional goals, it is argued to correspond to the elements of this aim.

3.2. Methods of Data Collection

The reference- and case-study had their own research method. During the study, solely qualitative research methods have been used.

Desk research

To be able to obtain knowledge about the main topics in this research, desk research has been conducted through the exploration of academic literature and policy documents. Desk research, defined by van Thiel (2014) as the use of existing data source which contain information that is not specifically directing towards the research, functioned as a basis to start the research and has been used throughout the study. The desk research supported multiple parts of this report, varying from the introduction and the theoretical framework towards literature on research methodology. Moreover, this method has been used to support other methods of data collection to use them in a proper way. Therefore, desk research has been used in both reference- and case-study, and it helped to answer all research questions.

Since the reference-study exclusively related to this research method, elements of this study will be elaborated here. A purposive sampling strategy was used to decide which adaptive vision or strategy to use in the reference-study. This strategy is not based on underlying theories and therefore, it is up to the judgement of the researcher to decide which document to use in this study (Tongco, 2007). This judgement resulted in various criteria: the adaptive visions should consist of multiple levels of government, both national and international (from a Dutch perspective) documents had to be used, and that it was a vision or strategy related to climate adaptation. By using these criteria, the documents were found which provided the possibility to create a general view of adaptive visions. In total, six adaptive visions are studied. Table 3 gives an overview of the documents.

Organization	Level	Name adaptive vision/ strategy	Date of publishment
Municipality of Rotterdam, The Netherlands	Local	Rotterdams Weerwoord - Urgentiedocument	2019
City of Melbourne, Australia	Local	Climate Change Adaptationn Strategy Refresh	2017
Province of Gelderland, The Netherlands	Regional	Actieplan Klimaatadaptatie - Samen op weg naar een klimaatbestendig Gelderland	2021
Province of Flanders, Belgium	Regional	Vlaams Klimaatstrategie 2050	2019
South Africa	National	National Climate Change Adaptation Strategy	2019
Indonesia	National	indonesia Climate Change Sectoral Roadmap - Synthesis Report	2009

Table 3: document-list of used documents in the reference-study (own table)

Semi-structured interviews

Semi-structured interviews are interviews in which a manual is used as a basis for a relatively open format (van Thiel, 2014). The interview manual lists several topics and leading questions that were discussed during the interview. The topics are based on the theoretical- and conceptual framework (van Thiel, 2014). This qualitative method has been solely used in the case-study. It enabled the possibility to gather as many perspectives as possible, by interviewing multiple stakeholder groups. As such, in resulted multiple perspectives on the process of The Guide, which is a contribution towards the research paradigm.

This method used the purposive sampling strategy as well. It enabled the researcher to choose interviewees based on its own judgement (Tongco, 2007). As a result, desk research on The Guide revealed the important stakeholders by which the stakeholder groups were established. Due to the variety of involved stakeholders, each stakeholder group has its own interview protocol, which can be found in appendices E, F, G and H. Table 4 lists the interviewees, their organization, and the reason why they are part of the study. The interviews helped answering all of the sub-questions, since this method has been used for all of them.

Interviewee number	Organization	Why?
1	External employee of the province of Noord-Brabant	Provides knowledge on process and content of The Guide
2	Employee of the province of Noord-Brabant	Provides knowledge on process and content of The Guide
3	Employee of the water authority De Dommel	Provides knowledge and perspective of an involved stakeholder within the process (water authority)
4	Employee of the water authority De Dommel	Provides knowledge on process and content of The Guide from an water authority perspective
5	External employee of the province of Noord-Brabant	Provides knowledge on process and content of the Guide
6	Employee of water authority De Dommel	Clarifies knowledge and perspective of an involved stakeholder within the process (water authority)
7	Employee of the province of Noord-Brabant	Provides knowledge on process and content of The Guide
8	Employee of the province of Noord-Brabant	Provides knowledge on process and way of working (province)
9	Employee of the province of Noord-Brabant	Provides knowledge on process and content of The Guide
10	Employee of the municipaliy of Eindhoven	Provides knowledge and a perspective of an important local involved stakeholders group (municipalities)
11	Employee of water authority Aa en Maas	Provides knowledge and a perspective of an involved stakeholder within the process (water authority)
12	Employee of water authority Brabantse Delta	Provides knowledge and a perspective of an involved stakeholder within the process (water authority)
13	Employee of the municipality of Meierijstad	Provides knowledge and a perspective of an important local involved stakeholders group (municipalities)
14	Employee of the municipality of Valkenswaard	Provides knowledge and a perspective of an important local involved stakeholders group (municipalities)
15	Employee of ZLTO (interest organization farmers and horticulturists)	Provides knowledge and a pespective of an important local involved stakeholders group (the agricultural sector)
16	Employee of H+N+S (landscape architecture office/ former external employee province of Noord-Brabant)	Provides knowledge on landscape design and the content of The Guide
17	Employee of Deltaris (Institute for applied research)	Provides knowledge on long-term objectives and transitions

Table 4: Interviewee-list with their corresponding numbers, organizations, and the explanations why they are involved (own table)

The interviewees were invited by e-mail and the interviews were conducted online, using the program Microsoft-Teams. In the introduction prior to the interview, it was stated that the interview would be recorder to produce a transcript for analysis. Therefore, the interviewees were made aware of their anonymity in the research. Because of anonymity, the interviewees are not mentioned by name in this report, only in relation to their organization.

Focus group discussion

A focus-group discussion, aiming to 'describe and understand meanings and interpretations of a select group of people to gain an understanding of a specific issue from the perspective of the participants in the group' (Liamputtong, 2011, p.4), has been used as a third method of data collection. These elements of a group discussion made it possible to focus on the first findings of the semi-structured interviews of this research and provided an understanding on the elaboration of these interview-findings. Practically, after the semi-structured interviews were conducted, the group discussion was held. The group discussion included the elaboration and discussion of various statements, which were based on the first findings of the semi-structured interviews. Within the discussion, three types of statements were elaborated: on The Guide, on

the objectives, and on the way of working. This group discussion helped to partly answer all the sub-questions since it included topics of all questions.
The group discussion has been held with a purposive selection of participants as well. Based on the researcher's judgement (Tongco, 2007), various criteria were set-up to decide on the participants: since the research resulted in recommendations for the province of Noord-Brabant, participants of the group discussion only should consist of employees of the province, and participants were chosen based on their availability and function within province. Moreover, some of the participants of the group discussion did collaborate in the interviews too. Thereby, some participants knew the details of the research, and some of them did not. Because of these criteria, a variety of perspectives and backgrounds were bundled, through which a general view on the topic was made during this group discussion. Table 5 shows the participants, their position, and their relation towards The Guide.

Participant letter	Organization	Position within province in relation to case-vision
A	Employee of the province of Noord-Brabant	Participant is involved within the process and development of the case-vision
B	Employee of the province of Noord-Brabant	Participant is involved in the implementation part of the case-vision
C	Employee of the province of Noord-Brabant	Participant will be involved in the process and steps after the case-vision

Table 5: Participant-list with their corresponding letter, organizations, and their position in relation to The Guide (own table)

The participants of this group discussion were invited by e-mail. The group discussion itself was conducted online, using Microsoft-Teams. To analyze the data of the group discussion, the discussion was recorded. Prior to the discussion, the participants were made aware of this recording and their anonymity. Therefore, participants are not mentioned by name in this study, only in relation to their organization and position toward The Guide.

3.3. Data Analysis

For each data collection method, different data analysis methods have been executed. The biggest part of this study's analysis related to the semi-structured interviews. Nevertheless, the data collected in the reference study and the group discussion was analysed as well.

Data analysis for the reference study
To be able to analyze the used adaptive visions from the reference study, the method of document analysis has been used. Bowen (2009) defines document analysis as a method to collect data by reviewing or evaluating document-materials in a systematic way. The data in documents were examined and interpreted to provoke explicit meaning, gain understanding, and develop knowledge (Bowen, 2009). Through document analysis, multiple national and international adaptive visions of governments have been studied to obtain information. As such, the document analysis resulted in information on transitions, adaptive capacities, and communication services in adaptive visions.

Data analysis for the semi-structured interviews
After the data was collected through the semi-structured interviews, the researcher was already familiarized with all the data through preparing, conducting, transcribing, and reading the interview transcripts. After being familiarized with the data, the data set was imported to the computer program Atlas.ti. Hereafter, a first round of open coding was executed based on interesting elements in the dataset and focusing on the indicators within the theoretical framework that emerged in the transcripts. After this first step of open coding, the codes were

categorized into themes by axial coding. The open coding and axial coding are processes which were done repeatedly to make sure all data is coded and categorized into themes with the same scheme. After these steps, selective coding was used in which the themes could be refined, and all the important features could be collected for the final analysis. Open-, axial and selective coding were the used steps and correspond to the definition William and Moser (2019) gave to them in their article. By executing these steps after all data had been collected, this study did make use of the thematic analysis. Braun & Clarke (2008) define thematic analysis as an analyze-method to identify, analyze and report patterns or themes within a dataset to enable the organization and description of a dataset in detail.

According to the definition of Braun & Clarke (2008), a thematic analysis consists of six phases. Phase one (familiarizing with the data) was executed by conducting the semi-structured interviews, transcribing them, and reading them. This is a phase which can only be justified by referring to the transcripts in the separated appendix. Phase 2 (generating the initial codes) can be justified by visualizing the code-scheme (figure 6). In figure 6, all the codes are divided into the group they belong to. This visualizes the link between the theory of this research and the dataset since the dataset is coded according to the theories. Furthermore, phase 3 consists of searching for themes. This step translates into phase 4 (reviewing the themes) succeeded in turn by phase 5 (defining and naming themes). These last three steps together resulted in thematic maps, which visualizes different links and the different themes. These thematic maps were created for each of the parts of this research: transitions, adaptive capacities, and climate services. Based on these maps, and its corresponding codes and quotations, phase 6 (producing the report) has been executed. This phase combined all above phases into a coherent text, which is described in chapter 4. The thematic maps of the phases 3 to 5 are shown in appendix B and form the basis for phase 6. In addition, appendix A shows a code-list with the number of times a code was used, and this supports the clarification of the arising themes within the dataset.

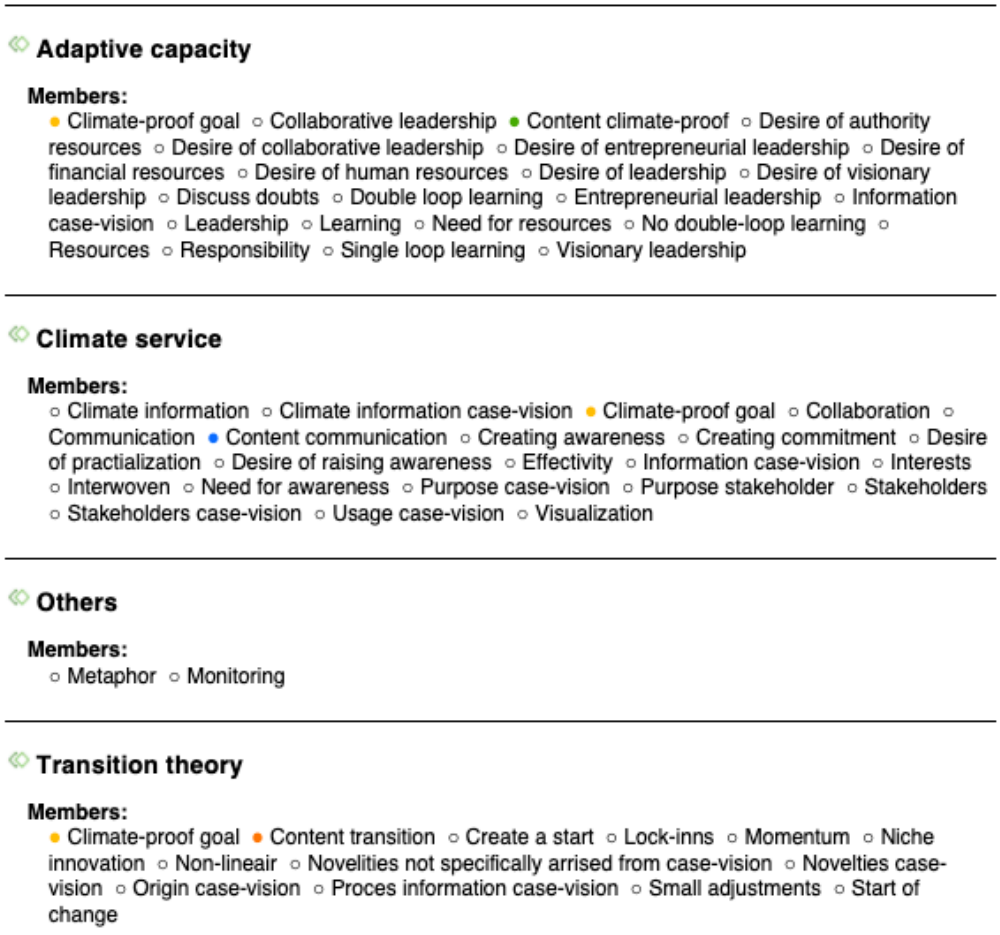


Figure 6: Screenshot of code-scheme as output of Atlas.ti

Despite the thematic analysis covered almost all data obtained from the interviews, the dataset sometimes referred to documents. For instance, this data method referred multiple times to The Guide, and it referred to the National Delta Program as well. Therefore, document analysis was used as well to cover all obtained and referred information possible. Although no document analysis form was produced, the same techniques of document analysis were used as during the analysis of the reference-study.

Data analysis for the group discussion

As explained, the group discussion was conducted to be able to evaluate and test the founded data in the semi-structured interviews. The group discussion took place right after phase 1 and during phase 2 of the thematic analysis. Thereby, the researcher was already familiarized with the data and could therefore decide which topics and statements to address in the discussion. Because of this, no special tool or method to analyze this data was used. As such, this method of data collection resulted in short summaries of each theme of statements. These summaries clarify the most important features of the group discussion. Accordingly, it was used as a basis to support the collected and analyzed data of the semi-structured interviews.

The different parts and methods within this research are visualized in figure 7 were part 1 is the reference study and part 2 is the case-study.

Figure 7: Visualisation of different steps and parts within this research (own figure)

3.3. Validity and Reliability

Both validity and reliability in this research has been ensured by using data triangulation (van Thiel, 2014). This research used multiple methods of data collections to obtain knowledge. Desk research, semi-structured interviews, and group discussion were conducted and therefore, one can argue that the data is checked multiple times. As such, this enhances the validity and reliability of this study.

Besides a mixed methods design, van Thiel (2014) argues that by using an appropriate sample size of expert interviews, the reliability and validity of the research is ensured as well. When ensuring a large sample size, the study ensures representativeness, and improves reliability. This large sample size enables to include a wide variety of experts on the same matter too. Therefore, the validity will increase (van Thiel, 2014). Since interviews were conducted 17 times with employees of the province of Noord-Brabant, water authorities, municipalities, locally involved stakeholders and experts on the subject, the large sample size and wide variety is ensured, and thus the reliability and validity.

Lastly, external validity determines to what extent the case-study is representative for other cases in view of climate-proofing an area (van Thiel, 2010). To start supporting the external validity of the case-study, the challenges The Guide pursues are of focus. The Guide is about climate change consequences (drought and floods) that influences the stream landscapes. Redesigning a stream landscape while considering these effects is something that will become more ordinary, since both effects will occur side by side more often, as argued by Lehner et al. (2006). Therefore, it is argued that finding a solution for both consequences and a balance

between them is something which becomes more important. Furthermore, within the process of The Guide multiple stakeholders and disciplines are involved, as explained in the introduction of the case-study (chapter 1.2). It is argued that this is common in the field of climate change, because of the interwoven processes and multi-level governance, explained in the theoretical framework of this research (2.1.2). Therefore, The Guide possesses characteristics of adaptive challenges. Finally, The Guide also includes features which are common for sustainability visions. Wiek & Iwaniec (2013) describe some common elements of visions in their article about visions in sustainability science. A vision should include a description of a desired future, different scenarios, and state different goals and objectives. Moreover, the visions lead towards key reference points for developing strategies and they ensure recognition and empower stakeholders (Wiek & Iwaniec, 2013). By reading The Guide and comparing it towards above elements, it is argued to be similar. Hence, by considering the common effects of drought and floods, the importance of finding a balance between them, the interwoven process and multi-governance perspective, and the corresponding elements of a sustainable vision, the external validity of this case-study is elaborated. However, it should be mentioned that all projects and visions have their own characteristics and its own experienced consequences to climate change. Therefore, a case-study can never consider all possible forms of adaptive visions.

Chapter 4: Results and Analysis

This chapter contains the results and analysis of the collected data, with the aim of understanding and answering the research questions. The chapter is divided in sub-chapters which are the different parts and research methods in this research.

4.1 Reference-study

The reference study is executed to gather information on adaptive visions and strategies in general. To be able to collect a wide variety of different perspectives, multiple adaptive visions and strategies are investigated. In total, six adaptive visions or strategies are studied, which are published by different levels of governments, both national and international. The visions are described in chapter 3. By conducting the reference study by doing a document analysis, knowledge on the transition, the adaptive capacities, and the climate services in adaptive visions should be clarified. The completed form of the document analysis is visualized in appendix C. Based on this form, an elaboration divided by the three topics of adaptive capacities, transition and communication tools will follow now. Within this elaboration, the most important and striking features, as are the main differences and similarities are stated.

4.1.1. Transitions in the Reference-study

After studying the documents on their context of the transition, a few features come to focus. To start, each document can be seen as a part of consecutive documents about the topic of climate change. For instance, the climate adaptive document of the city of Melbourne is a successor of the climate change adaptation strategy which was published in 2009 (City of Melbourne, 2017) and the climate adaptive document of South Africa is based on multiple national, regional, and local climate change related policy documents (Republic of South Africa, 2019). Moreover, another corresponding feature within the context of transition is that objectives which contribute towards the end-goal are stated. One element in these objectives which is commonly mentioned is the notion of monitoring. This task is something which enables the possibility to evaluate and adjust the way forward. For instance, it is mentioned in the document of the province of Flanders (2019), which states that since the future is unpredictable, it is important to have a flexible long-term strategy. To be able to respond to unpredictable changes, the way forward will be monitored and evaluated regularly, and this enables to have a flexible strategy towards the future. This is corresponding to the notion of non-linearity of the MLP of Geels (2011).

In addition, also a difference between the documents can be identified. The end-date of the transition or main objective differs. Where the city of Rotterdam wants to be climate-proof in 2025 (Gemeente Rotterdam 2019), the province of Gelderland (2021) and the province of Flanders (2019) are both aiming to be climate-proof in 2050. The Republic of South Africa (2019) and Indonesia (2009) both stating a sorter transition timespan too, around 2030. The city of Melbourne (2017) is not really stating a clear end-year goal; however, they want to correspond towards an earlier published document about climate change which has 2026 as a goal. Thus, also in Melbourne a short time span is identified.

4.1.2 Adaptive Capacity Supplies in the Reference-study

At least one corresponding feature of adaptive capacities can be identified in the reference-study. Each document clarifies the climate change effects and the consequences the changing climate has on the specific area of government. Similar are the effects of the increase of intense precipitation, increase of heatwaves, increase of droughts and floods. In addition to these

common effects, some governments go into more detail. For instance, the republic of South Africa is stating that fires because of the effects of climate change is something the country must deal with (Republic of South Africa, 2019). The city of Rotterdam must deal with subsidence because their peaty soil is vulnerable to the effects of the climate change (Gemeente Rotterdam, 2019). Linking this feature to the theoretical framework of this research, the notion of information in the CID-template of Raaphorst et al. (2020) is argued to be corresponding. Since clarifying data within adaptive visions, information about the effect of the changing climate is spread.

Besides the quite similar elaboration of climate change consequences, a difference can be identified too. This difference comes to focus when the different levels of government are considered. The governments of the cities of Rotterdam and Melbourne are mentioning specific local areas, such as a street or a square, where adaptive projects are taken place (Gemeente Rotterdam, 2019; City of Melbourne, 2017). This level of local focus gradually decreases as the level of government is magnified. For instance, the adaptive visions of Indonesia and South Africa are stating abstract objectives, such as '*promote the integration of climate change adaptation response into development objectives, policy, planning and implementation'* (Republic of South Africa, 2019, p. 21). The regional governments of Flanders and Gelderland are in-between: not super abstract as the central governments, but also not that specific as the local governments (Vlaamse Overheid, 2019; Provincie Gelderland, 2021). This difference can be argued to be corresponding to the notion of novelties of MLP of Geels (2011), since the mentioned objectives or projects are steps after the adaptive vision.

Finally, a last feature in the adaptive capacities is the difference of how governments state their desired the end-goal. Overall, there are only a few statements or paragraphs about how the desired future should look like, namely: describing how a climate-proof area should look like or what adaptive actions should be taken. Standing out of the others is the city of Rotterdam, which described two perspectives for 2050: one perspective about how the city will look like when nothing happened, and no action is taken. The other perspective about how the city will look like when climate-proof measures will become the mainstream in the city. Stating both perspectives in the document, the differences between climate action and no climate action is clarified. It contributes towards the imagination too: how does a climate-proof Rotterdam looks like? Accordingly, the city of Rotterdam is climate-proof when, for instance, all neighborhoods do have quick access to a greenspace and buildings can resists precipitation of 70 millimeter or more (Gemeente Rotterdam, 2019). Although the municipality of Rotterdam is not the only government which state something about how the desired future looks like, since the province of Flanders and Gelderland are also arguing how this future should look like (Vlaamse Overheid, 2019; Provincie Gelderland, 2021). However, it is striking that not every government within this study is visualizing this future and therefore, remain abstract about their future. This can partly be explained by news-articles which argue that Rotterdam is one of the international front-leaders when climate adaptation and climate-proofing the city are considered. For instance: *'leading by example Rotterdam takes climate action to enhance resilience'* (Royal Haskoning DHV, 2020). In this account, you could argue that the city of Rotterdam is a visionary leadership according to the knowledge obtained from the Adaptive Capacity Wheel of van den Brink et al. (2014).

4.1.3. Communication Tools in the reference-study

To close the reference study, the documents are studied on their communication tools. Within the CID-template, the indicators of stakeholders, purpose, information, and visualization are included (Raaphorst et al., 2020). When using this knowledge, a similarity is identified.

Correspondingly, all documents have the purpose to clarify the climate challenges, the way forward and the involvement of stakeholders within the process. For instance, the purpose of the document of the province of Flanders (2019) is to contribute to strive towards the end-goal of being climate-proof in 2050. This is corresponding towards the purpose of the document of the province of Gelderland (2019), which is to clarify the steps which needs to be taken in the way towards a climate-proof Gelderland. Although this major similarity, a difference between can be identified which is the extent to which involved stakeholders are mentioned in the document. The document of the municipality of Rotterdam states that on average, 60% of all land within the municipality is privately owned. Because of this, the municipality of Rotterdam argues the importance of citizens in partial solving the problem, and it clarifies the importance of collaboration between governments and private stakeholders (Gemeente Rotterdam, 2019). Conversely, the document of the province of Flanders (2019) does not mention any role or responsibility for other stakeholders than the government. This can be explained by that the document is really about what the government should do. However, no specific responsibility for society can be identified while this is, as argued, something that should be one of the main focuses. The city of Melbourne (2019) is arguing for another stakeholder to involve. Within their document, they agree on the position of Rotterdam (2019) about the importance of citizens and society. However, they go into more detail on specific stakeholders (a water utility and the regional government) when real action should be taken and implemented. The document of the republic of South Africa (2019) is worth mentioning here too. Within the document of this government, all governments and the society are the intended stakeholders.

Additionally, another difference is the way in which the documents are designed and visualized. Overall, a difference between the Dutch documents and the foreign documents can be identified. The Dutch documents are designed with graphs, pictures, and different styles of text. In contrast, the document of the province of Flanders (2019) and the document of South Africa (2019) are both long texts without many attractive graphs to clarify information. Although each document is supported by maps and graphs, there is a difference to the extent to which they are visualized, and this has influence on the attraction of such documents.

4.2 Case-study – Semi-structured Interviews

The case-study is executed to obtain in-depth knowledge and is explained in chapter 1.2. Partly this knowledge is obtained through conducting semi-structured interviews. In total, 17 semi-structured interviews are conducted (listed in table 4). Based on the conceptual framework, indicators which supports the research questions of this study are elaborated into multiple interview-protocols (appendix E, F, G and H). After collecting the data, the method of thematic analysis is executed over the transcripts of the interviews. This analysis results in executing multiple steps (explained in chapter 3.2.2). In this chapter, the results of phase 6 of the thematic analysis (producing the report) are stated. The results are ordered based on the topics in the interview protocol which in turn are based on the theoretical- and conceptual framework. A code-list which clarifies the share of a code within the dataset is visualized in appendix A and the thematic maps of each theory visualized in appendix B. Both appendices are forming a basis for this chapter. Furthermore, each topic is supported by multiple quotes derived from the transcripts. Each quote starts with a number, which is the corresponding number of the interviewee. The specific number of an interviewee is defined in Table 4.

4.2.1. Transitions in the Semi-Structured Interviews

When focusing on a long-term goal, transitions are of importance as argued in the theoretical framework. Within this focus, multiple indicators are exposed and the most important one is the indicator of niche innovations since this is the start of change (Geels, 2011). Overall, the

transition of The Guide is originally caused by the indicator of lock-inns. This led towards the importance of having a niche innovation, since this sets the basis for change. In turn, this should lead towards a change of regimes. To elaborate the transition in the case-study, it will be explained based on why the transition was necessary, what the start of change entails and where it should lead to. In other words: the past, the present and the future in the case-study are discussed. Within explanation, the process and development of The Guide is incorporated.

The past: the cause and process towards The Guide
When explaining the cause and the process of The Guide, the indicator of lock-inn and the process towards publication of The Guide are important as this causes the need to change the current status of the stream landscapes.

Lock-inns
Because of lock-inns, it is necessary to steer to change as they have caused difficulties. As Geels (2011) explains in his article, a lock-in creates path-dependency and in turn ensures that things happened, decided, or occurred in the past are still have a big influence on what happens and gets decided nowadays. In addition, Geels (2011) gives a few examples of a lock-in in his article: investments in the past, infrastructure, the degree of commitment and competences, and shared beliefs and discourses. When using this knowledge in the case-study, various lock-inns which caused the current situation are identified. Firstly, besides streams are surrounded by nature (as is the case in the Tongelreep), they are often surrounded by agricultural land (as is the case in Zundert and the area of Noord-Oost Brabant). These functions matters, as it determines mostly the amount of damage the consequences of climate change can cause in an area. Furthermore, the function determines the amount to which an area can easily be redesigned to be able to endure the effects of the changing climate. Nevertheless, this does not imply that natural area can easier be adapted towards a climate-proof version compared to agricultural area. It only suggests the existence of differences to the extent an area is influenced by the transition towards a climate-proof future. An example of the surrounding area of a stream in Brabant is the stream 'Aa of Weerijs', which runs right through high-quality crops around Zundert. By contrast, the stream 'Tongelreep' runs mostly through natural area. In this account, a lock-in can be identified. It is not coincidental that streams as the 'Aa of Weerijs' are in the middle of agricultural land. In the past, such agricultural land was assigned towards these spots through reparcelling as this was the most fertile soil because of floods. Therefore, these locations where the most precious land from a farmers-perspective. Because of the fertile, this specific land was interesting for agriculture, and this resulted in reparcelling as close to the stream as possible. Eventually, through the development of locks and weirs this agricultural land was prevented against floods in a way that it could not damage the crops on it. The quotes below explains this lock-in.

'[2] Then you have the tree-growers. And if you look at the Aa of Weerijs for example, you also must deal with other farmers. And some just have agricultural areas that were just created that way, by reparcelling for example, down to the stream. Up to these narrow streams. And then you have to think about whether that is the right function...'

'[15] We are used to live and work in an adapted stream landscape system. With weirs, with locks. This has not only consequences for the farmers, but also for the way of living and working in the entire area'

In addition, the amount and size of farmers is part of the lock-in of the current situation too. This can be explained by multiple factors, which mostly starts around the time of the Second

World War. During this war, the Netherlands has known famine and that is why after the war, the Dutch government has promised that famine would never happen again. This resulted in enormous growth of the number of farmers. In turn, this led towards an intensive way of agriculture. Because of such numbers and sizes, the farmers community has created a degree of influence in politics. Not only on state-level, also within water authorities and provinces. This contributed to political decisions which are beneficial from a farmers' perspective. For instance, water authority 'De Dommel' explained that a political party who represent the target audience of the farmers will interfere when decisions are made that concerns them. This interference is beneficial for the target audience. As the article of Geels (2011) clarified, such decisions do influence what happens, gets decided or occurs nowadays. In other words, such decisions can, because of the target audience a political party represents, be in favor or the agricultural land and not so much in favor of nature protection or climate-resilience. Of course, the other way around as well. However, climate change, its consequences, and awareness on it is only something from the last decades. Therefore, before the climate knowledge was obtained, decisions were made which do not take the climate crisis into account. Such decisions still influence the current situation. The quotes below support this lock-inn.

*'[11] From the 60s, after the war, Mansholt (*former Dutch minister) *said: never hungry again! We must never be hungry again in the Netherlands. Therefore, the production got ramped up. That is what we wanted in the Netherlands at that time. As a government and as citizens. Now we are at the point where we have too many farmers and large scaled farmers. Now we have to phase out'*

'[2] Water authorities still have a great interest from the agricultural sector, in discharging the water as quickly as possible. It is starting to turn, but these are just processes that will take years. It is a transition'

Moreover, one could argue the actions and political instruments against the effects of the changing climate as a lock-in as well. Due to some major floods in the past in the Netherlands, the focus was on dike reinforcement and making sure that buildings stayed dry. Besides floods, other climate change effects started to occur too. For instance, heat and drought. For these latter effects, no clear rules or norms are available in The Netherlands since these are newly experienced effects. This can be explained as a lock-in because the focus on floods and water precipitation took partly away the attention of heat and drought. This resulted in limited rules and therefore backlog work to ensure that such effects are less damaging. The quote below supports these statements.

'[3] The joke is that we, in the Netherlands, were very used to and have all kinds of standers for the way how we deal with high water. Think of river dikes: there is one dike reinforcement after the other. All because the level is rising; we notice that the water is getting higher. But, at the bottom there is nothing at all. That is underexposed. In the past for sure, and now we have to pay attention towards it more'

Overall, these lock-inns led towards the current state of the stream landscapes in the province of Noord-Brabant. Since the changing climate causes drought, soils are damaged. In turn, this causes floods more often. Therefore, streams need more space. Because of this, something needs to happen to ensure a safe and healthy province in the future again. The quote below is a contribution to this statement.

'[13] But what you see now is that you allow the landscape to become part of the decision-making process. And that has been discussed very little until today. Why? Because we thought: we can make everything possible through technical measures. But with the every-increasing knowledge of today, it turns out that it has not been very useful in all cases'

Process towards The Guide

The explanation of lock-inns leads to the process prior to the publication of The Guide. As already stated, The Guide is originally assigned from the Environmental Vision (2018) of the province of Noord-Brabant. During the development of this vision, different features where appointed and together these features should ensure an improvement of the living environment in Brabant. Among others, the feature of climate-proofing the province should contribute to this. To become climate-resilient, the stream landscapes came to focus as it consists of almost the whole province (Provincie Noord-Brabant, 2018). This form of landscape is under pressure because of the climate change consequences. Therefore, climate-proofing this type of landscape would be beneficial to ensure the climate-proof future. In the Environmental Vision a new approach was introduced as well. The layers-approach *('diep, breed en rond kijken'*) is a starting point for the elaboration of the vision and it aims for more room for input from other disciplines and parties. To implement this layers-approach within the challenge of stream landscape, and to make it all more practical, the use of pilot-projects came to focus. Within the pilot-projects, three projects where created. In the northeast, in the middle, and in the west of Brabant and they all include a stream. Within the projects, the layers-approach was implemented to climate-proof the streams. The Guide is a document which describes the first steps of these pilot-projects. The quotes below support the process- and origin of The Guide.

'[7] The climate-robust stream landscapes; that comes from the Environmental Vision. It is also listed in the vision exclusively as a case. We have three pilots in Brabant. In the northeast, the 'Aa'. Below Eindhoven, the 'Tongelreep/ Warrenbeek' and around Zundert the 'Aa of Weerijs'

'[9] When we started our vision, we also started with a number of pilots. Including these pilots was The Guide, to look at three stream landscapes and learn how that evolves and how you can take steps while you are working together with different partners'

The present: The Guide as a niche innovation

The Guide and the indicator of niche-innovation are argued to be equal, as the conceptual framework explains. Below, this statement is elaborated by the input of the interviews.

Niche innovation

According to Geels (2011), a niche is a protected space for innovations which differs from the current regime. As such, it is the seeds for change. Overall, a niche provides guidance and attracts attention to build a network to enroll more actors (Geels, 2011). When this knowledge is projected over the dataset, multiple similarities can indeed be identified. First, it is argued that the rural area is the basis to solve climate-related problems. Within this area, there is space and, therefore, problems can be solved which cannot be solved in urban area. This has to do with space scarcity in the urban area. Secondly, it is argued that the pilot-projects can experiment with different approach of working. This is not without obligations as it is argued that choices made in the beginning have great effect on the result. Despite, this argues for another way than the current way of working. Lastly, The Guide should be viewed in a step-by-step manner as well. At first, there are abstract objectives. Through agreements, instruments and documents, more direction is provided. Eventually, it should become commonplace.

Hence, by considering the share of the rural area as a basis to solve climate-related challenges, the incorporation of the layers-approach, and the step-by-step manner which should result in commonplace, is argued that The Guide is indeed corresponding to a niche innovation. The quotes below are a contribution towards these statements.

'[1] But I think that if you look at the potential of where the biggest problems lie to contribute to solve them, then it is the rural area for Brabant. That is because within this land, there is room to try and solve things you cannot manage in the city'

'[7] You should see it step-by-step. That you first formulate your objectives at an abstract level and then giving it more direction through underlying agreements, instruments, and documents. Ultimately, this just makes it commonplace, so everyone gets started with it'

The Guide is produced through a collaboration between the province of Noord-Brabant and, among others, the water authorities. It is argued that the pilot-projects within the document are a new focus for these organizations. For instance, the responsibility of water authorities lies within regional waters, to remain a sufficient quality and quantity (Rijksoverheid.nl, 2021). Because of this, water authorities focused on the stream valley. This valley includes the stream and its surrounded land. However, because of the establishment of new knowledge and the emerging climate change consequences, this focus is not enough anymore. Through the pilot-projects in The Guide, the focus is shifting towards the stream landscapes. It is another focus and therefore, a change of the perspective of organizations. Within this new focus, the flanks and the high sandy soils are of interest as well. Due to the broadening of focus and area, more disciplines are involved and should collaborate with each other. For example, the spatial planning should take this wider perspective into account when granting permits. The quotes below contribute towards these statements.

'[8] The movement that is noticed in recent years is that when we talked about the streams, or stream restoration, we were only talking about the bowl: only the stream itself. We are now focusing more and more on that you must look at what is happening on those flanks, and what is happening on the infiltration grounds. So, if you fix all of that, you create a much more robust system'

The future: the transition towards the end-goal

To close the case-study in relation to its transition, the part after The Guide is elaborated. This part lead towards the indicators of novelties and new regimes. Besides, after elaborating the whole process, it is of interest what happened with The Guide.

<u>Current status of The Guide</u>

It was thought that the province of Noord-Brabant could have a role in the next step of The Guide, to not remain at pilot-level but to roll it out over other stream landscapes. Nevertheless, it becomes clear that still today no concrete next step is taken. A few things are unclear, namely: what is the practical translation of The Guide and what should be the role of the province? Therefore, it is argued that the current status of The Guide and its process is on pause. Overall, there is a demand for a successor of The Guide to offer guidelines to stakeholders who can work with it in practice. The quote below supports this observation.

'[2] What has not happened recently is to translate what was intended in the vision, and what this means in practice. And, what this means for the role of the province. But above all: how

can we make this more concrete. Basically, that you say goodbye to the pilot phase and say: those are the projects that are needed'

Novelties of the Guide

Despite the province of Noord-Brabant does not have a clear direction of a successor in mind, there are various novelties which are a contribution towards the end-goal. It becomes clear that two themes of novelties can be identified in the dataset, which provides a division in the view of where novelties arise from. One theme is about novelties directly related to The Guide, while the other is about novelties not originated from The Guide but pursue the same thoughts. Table 6 lists all novelties with a short explanation and is based on appendix D, where a broad elaboration of all novelties is described.

No.	Name + input	Theme	Description	Supporting quote
1	**Kenschets: Opmaat naar Klimaatrobuuste beeklandschapppen – Noordoost Brabant op maat** Interview: 1, 11, 13, 15	Related to The Guide	This is a novelty of the pilot-project in the Northeast of Brabant, and it results in a guideline for municipalities in the transition towards 2050 in view of stream landscapes. Besides, it identifies what possible actions should be taken.	*'[1] What we did is developing a kind of guideline for municipalities in the North-east, based on the future perspective of 2050 and what kind of action this could yield. <>We Just made an offer-letter to all councils. Soon, this will be produced, and the report will be presented to all the councils of all municipalities'*
2	**Design opportunities in the landscape** Interview: 1, 11	Related to The Guide	This is a result of the pilot-project in the Northeast of Brabant. The novelty is an area-studio were through collaboration with various stakeholders the landscape is investigated to find specific spots to intercept the effect of climate change.	*'[11] In addition, there has been an impetus for area-studios. We explored with the municipalities, farmers and citizens the area and what we can do in view of climate-proof'*
3	**Aa of Weerijs around Zundert** Interview: 2, 5, 9, 12	Related to The Guide	This novelty is a pilot-project of The Guide in the West of Brabant. This novelty is focused on collaboration between non- and government organizations to approach the transition towards a climate-robust stream landscape collaboratively.	*'[9] In Zundert we are now following the area-oriented approach. So, we want to work through that direction towards an area agreement in which you make agreements with partners about how we are going to implement, what time frame, what capacity and what resources are part of it'*
4	**Vision Tongelreep** Interview: 3, 4, 6, 10	Related to The Guide	This novelty is part of The Guide since it is the pilot-project in central Brabant. In this novelty, government organizations collaborated, and this resulted in a vision for the stream landscape of Tongelreep.	*'[4] Within the core-group, conversations are held. What is climate-proof? What are bottlenecks? What are the interests? Which steps could we take? A product of the core-group and a product of the discussions between the parties is a vision. This vision was published last month (April 2021). The next step is to inform the directors on this vision'*

5	**Bouwstenen** Interview: 7, 9	Related to The Guide	Although unclarities exist over the next steps of The Guide, through the 'Bouwstenen' the province is developing a novelty as well. The 'Bouwstenen' includes lessons learned and experiences of the pilot-projects of The Guide.	*'[7] We are in the middle of learning from the pilots. In the meantime, we experienced already a few things. We are aiming to process these experiences towards so called 'bouwstenen'. <> You can imagine that a climate robust stream valley consists of all kinds of concepts, and you can unravel these concepts in all kinds of loose things. One of the cases is for example that there should be more infiltration on the flanks'*
6	**The Guide 2.0** (Provincie Noord-Brabant, 2019) Interview: 1, 2,	Related to The Guide	Despite it is argued that no successor of The Guide is developed, there is one. After a year, the province developed The Guide 2.0 which updates The Guide with new information obtained from the pilot-projects. In this note, definitions and measures are described. The note was never published in public.	*'[1] However, at one point a note was written by [name employee of province}. This employee has made an analysis of what we can learn from this. The analysis ended a bit open. Because that is what it was all about: what should we do with it as a province? It was mainly an internally focused approach. You can also say: what can we learn from it together? Or, for example, what could be the role for the water authorities? Or the municipalities?'*
7	**Gebiedsgericht aanpak groenblauw (GGA)** – area-oriented approach green blue. Interview: 5, 9, 7	Not related to The Guide	This is an approach to incorporate integrality in approaching a development. When an area is redeveloped, the area and its surroundings should be part of the development. This approach is derived from KRW which aims to improve the hydrologic quality of nature by 2027. Climate robust stream landscapes are part of this whole perspective but are not the main objective.	*'[5] What you actually see, from an area-oriented approach… Determining the course, together programming and realizing it area-oriented. Here you see that there is an interaction. You cannot do one thing without not taking or leaving the other. This is something what the province is doing well. It is called Green blue. So, you are going to designate areas for that'*
8	**Klimaatonderlegger** Interview: 13	Not related to The Guide	The 'Klimaatonderlegger' came to focus during data collection at a municipality. It is a map to include in the administrative decision-making process and it provides a foundation to incorporate landscape-qualities in these processes.	*'[13] It is a map that is built up from layers, and from what do we recognize that? The environmental law, which is also based on layers. It is a map where you will find certain landscape qualities. You can include this in your administrative decision-making process, for example regarding housing or the development of industrial areas. What you see is that the landscape thus becomes part of the administrative decision-making process. Thus, if you want to include landscape qualities in spatial*

				planning, you can make use of the map'
9	**Delta Program High-Sandy Soils** Interview 8, 16	Related to The Guide	This is a National Plan which focusses on the challenges on high-sandy soils, based on water scarcity and quality. The Deltaplan resulted in a specific document for the province of Noord-Brabant where technical measures are described to solve the challenges. Since stream landscapes are part of the high-sandy soils, it is in relation to the perspective of The Guide. However, it cannot be totally assigned towards The Guide since it is a national program.	*'[16] The Delta Program high sandy soils: within the document, real technical measures are stated, and people can also apply for subsidies for such measures. For example, those weirs or the meandering of such a stream. <> This also includes the stream landscapes. So, it is a kind of a next step. A step which is on the stream valleys, but also on the high sandy soils'*
10	**Design-thinking** Interview: 8	Not related to The Guide	This novelty does not relate to climate change or stream landscapes, but it is a new way of approaching wicked problems. In this approach, the interests and opinions of other stakeholders are incorporated and provides a basis for searching for solution paths. In this way, a governmental organization is observing more after which small steps are taken, based on the suggestions of others. This approach reduces uncertainties by other stakeholders since they are already involved in the process.	*[8] I think we should be a little more open to sounds from the area itself. Together with the water authorities and the national government, we should look at what that means for the area. <> That you really try to do it much more together. That is one of those core things from design thinking. That you try to find what they call the human dimension'*
11	**KLIMAP** (Climate Adaptation in Practice) Interview: 17	Not related to The Guide	KLIMAP is a project which develops a methodology in which adaptation pathways on a decentral level are the focus. The project is developed by using a iterative approach and a key-feature is the notion of time. Measures part of adaptation on a decentral level are put in time, so it becomes clear what possible pathways there are towards the future. This project is seen as an equal basis of	*'[17] What we see is that a lot of climate adaptation measures or visions, they are often on a higher scale level; so nationally. And they are often very abstract. We really want to work with KLIMAP towards climate adaptation in practice. Thus, on a manageable scale. That differs per case or per subject. We want to contribute to the implementation of climate adaptation measures, in order to make the landscape more climate-robust'*

			research, and it is conducted by an Institute for Applied Research.	

Table 6: Explanation of novelties obtained from interviews (elaborated version in appendix D)

Towards a new regime

The niche innovations and novelties should lead towards a change in the regime-level. As clarified by Geels (2011), the regime is the deep structure that stabilizes the existing systems. Regimes are characterized by lock-inns and refers to set of rules that coordinates activities of all social groups (Geels, 2011). When using this knowledge in the data set, a couple of themes come to focus. First, The Guide with the novelties provides guidance. It provides a common direction to start the change. When creating a project that changes the current situation, a couple of elements are argued to be generally used, namely: creating a desired situation, making use of an example and just start the process. Below, a couple of quotes are a contribution to these statements.

'[7] It is in fact the basis from which you work. And based on which you try to bind all kinds of parties that play a role within the challenge'

'[5] When you want to succeed a project, multiple themes should be part of it. You should create a desired state, you should make use of an example and you should just start the process'

Secondly, the indicator of non-linearity of the MLP of Geels (2011) clarifies a theme in the dataset as well. It is argued that a long-term goal is reached by short term action, through the various novelties. Besides, non-linearity has to do with repeating steps in the process towards the future too. Information should be added, refined, again adding new information, and adjusted towards the objectives. These steps should be repeated multiple times and therefore, a non-linear path arises. This is a process that is used at the national-level as well: stress-tests to map vulnerabilities, conducting risk dialogues with all relevant stakeholders, clarifying which measures may apply in an area after which the measures are formulated that are prepared to take. Eventually, this should lead towards implementation. Despite this clear order, each step is reviewed and repeated multiple times and this is contributing towards a non-linear process towards a climate-resilience. The quotes below supports these statements.

'[7] You should see it as: there are 5 steps, but each time an arrow goes from the second step back to the first step. And from the third step back to the second step, and from the fourth step back to the third step. It is continually repeating of what you are doing because you cannot do everything at once'. * The five steps mentioned in this quote are corresponding to the steps of the national level in the text above.

Finally, the indicator of momentum is a theme within the change towards a new regime as well. According to Geels (2011), niche-innovations cause momentum, whereby an acceleration of action arises. A few times, such a momentum is mentioned in the data set. For instance, innovations gain momentum when something remarkable happens. This remarkable event has to do with an extreme effect of climate change. When these events happen, there is fresh focus on the topic, and this ensures that action is taken. Below some quotes which support this statement.

'[10] I'm hopeful there will be a spin-off…The recent precipitation is helping. In Eindhoven, there has been water on the streets and there is some damage too. This naturally helps to maintain awareness and to get people moving towards the objective'

'[13] … this is how we should do it. And I hope it gets a little rough every now and then. That we are admonished with: just start with it!'

4.2.2. Adaptive Capacity Supplies in the Semi-Structured Interviews

Although above paragraph already mentioned various words on adaptive capacities as supplies, it is elaborated here. When projecting the indicators of the theoretical framework on the dataset, multiple themes can be identified.

Learning and information

According to van den Brink et al. (2014), climate change is a relatively new issue. Therefore, the indicator of learning of the Adaptive Capacity Wheel should be enhanced to provide new knowledge. Discussing doubts, single loop- and double loop learning are indicators part of this feature. Besides learning, the indicator of information of the CID-template explained in Raaphorst et al. (2020) is a contribution to create this knowledge of climate resilience as well. This indicator should investigate if documents clarify the appropriate information (Raaphorst et al., 2020). Since both indicators aim to clarify, they are merged in this paragraph.

Learning

It is argued that The Guide up to now has had a single-loop learning process and that there is longed for a double-loop learning process. Within the article of van den Brink et al. (2014) and in Gupta et al. (2010), the single loop learning process is explained as the process to learn from past experiences through which routines are improved. The double-loop learning process is explained as a learning process where assumptions and norms are changed (Gupta et al., 2010). It is identified that until now the province of Noord-Brabant has developed a small successor of The Guide (novelty number 6). Within this note, a single loop learning process is found as it states what can be learned from the experiences within the pilot-projects. However, no further actions are mentioned on what change should emerge in the approach of the province and in collaboration with other organizations. The quotes below supports this observation.

'[1] However, at one point a note was written by [name employee of province}. This employee has made an analysis of what we can learn from this. The analysis ended a bit open. Because that is what it was all about: what should we do with it as a province? It was mainly an internally focused approach. You can also say: what can we learn from it together? Or, for example, what could be the role for the water authorities? Or the municipalities?'

Hence, this observation lead towards clarifying the single loop learning process that has took place within the whole process of The Guide. In turn, this asks for a closer look at the sort of small successor of The Guide, which was made in the form of a note. Within the note, climate-proof is defined as being able to withstand extreme weather conditions by limiting the consequences of extreme precipitation and extreme drought and heat. Water robustness is defined as well, as the quality and availability of water at any time and in any amount necessary for a specific location. By combining both climate-resilience and water robust, climate robust emerges. This can be defined as balancing too little, too much and too dirty water in space and time. Moreover, the note describes measures that could be taken to withstand extreme precipitation and extreme drought. For instance, a measure which could be taken when there is too much water is to use nature as water buffer and create winding streams with dynamic

drainage. Examples of measures which could be taken when there is too little water are given as well. For example: creating water buffers, filling up watercourses, and promoting infiltration and sponge action at high parts or on the flanks (Provincie Noord-Brabant, 2019). In all, it can be argued that this note gives a clear basis of knowledge on what the topic entails and what you could do with it. Although this is a contribution to a single loop learning process, no double-loop learning process can be identified. It is argued that such a double-loop learning process will create the incorporating of the obtained single-loop learning in the daily activities of all involved stakeholders. Despite, this turn is not found.

Subsequently, the indicator of discussing doubts is part of this learning dimension of van den Brink et al. (2014) as well. In the article of Gupta et al. (2010), it is stated that when an institution wants to have a high adaptive capacity, it should enhance learning by considering doubts and uncertainties. Therefore, it should become clear what sort of doubts exists among the participants and this should promote learning and the creation of information. Within the dataset, it becomes clear that there are three themes of doubts which comes to focus. Firstly, one doubts is about how a climate-robust stream landscape should look, or more generally, how 2050 should look. When elaborating this doubt, the second theme becomes emerges. There are various objectives which should be accomplished by various measures. However: how are such objectives and measures implemented in a specific area? This leads towards the second doubt, which is about the lack of practical objectives. For instance, The Guide 2.0 mentions measure which can be implemented when there is too much water. However, how should this look in for example the stream landscape of the Tongelreep? This level of practicality is needed to be able to make contribute toward such objectives. Accordingly, when this level of practicality is enhanced, this provides a clearer view of how a climate-proof future should look, as well it provides a clearer approach to implement it in a specific area. Finally, a last theme of doubts is identified. This theme is about land purchase and raising awareness among important local stakeholders. For instance, when you need the surrounding land of a stream to be able to broaden its buffer-capacity, often this land should be purchased from local stakeholders. When no purchase is considered, it depends on the willingness of the stakeholders to increase the buffer-capacity themselves. However, when for example the local stakeholder is a farmer, it is hard to clarify that they should improve their land into a climate-resilience version. This difficulty can be explained by that these stakeholders depending on their land as it is their way to earn a living. When thinking about a climate-proof future, such other interests should be considered as well. As a result, considering the doubts discussed in the dataset, it provides some sort of desired information in the future. The quotes below supports this indicator.

'[14] We want to be climate proof by 2050. But that is not yet defined, just like with many people, what exactly is meant by this. What 2050 should look like in a clear view. Yes, that is still very difficult. And then it also makes it difficult to act now. And then it makes it challenging to take measures and do things, because you don't have the final image yet'

'[15] I try very hard to look at the daily life of our farmers from: it's all nice those studies, but what does it mean for them? And can this also be turned into a realistic business model in the future? So, I'm fierce in those studies, also towards WUR. I think it should also be applicable science'

'[11] The biggest problem is the land purchase. There is the problem of buying land from farmers, to widen those streams'

Information

The information indicator of the CID-template in the article of Raaphorst et al. (2020) is elaborated into the adaptive capacities as well. Within this article, Raaphorst et al. (2020) state that when creating an appropriate level of information in a climate service, it contributes to correctly understand such documents. Although the elaboration of this theory is explained in chapter 4.2.3, the conceptual framework in this report argues that by identifying this indicator, it clarifies what the supplies of adaptive capacities entail. A couple of themes in the dataset which supports this are identified. Firstly, it is argued that the information relates to the changing climate. It is identified what consequences of climate change occur in the stream landscape and which measures possibly can be incorporated. It becomes clear that in the stream landscape, general climate change consequences occur. Heat, drought, extreme precipitation, and flood are the mentioned consequences. Since these consequences are explained in the introduction of this report already, this will not happen here. Secondly, it becomes clear that the stream valley itself has a kind of end-of-pipe conception; the stream is a kind of well for the whole area. When the water flows in the stream eventually it is flown away to bigger rivers within days. When the climate effect of drought occurs, this is not desired. If possible, the water should be kept in the area, since then the water can be used when there is a period of drought. Moreover, when all the water goes directly to the streams, this causes the possibility of floods as well. To solve these challenges, the focus should be increased towards higher soils and flanks in the stream landscape. When the water is retained there, climate problems will occur less in the stream itself. This perspective contributes to increase knowledge as it clarifies the shift in perspective from the stream towards the whole landscape. Within the dataset, the quotes below support this information statements.

'[3] In addition, there is a kind of end-of-pipe thoughts in the stream valley. I keep repeating that, at all meetings or conversations with administrators, that if the water is in that stream, then a few days later it is in the Maas near the Dommel and then it is gone. So, if you really want to hold onto something in the area, you must look higher up. Then you must infiltrate in the flanks of the area. Not in the stream, that is the lowest point of the landscape. That is a difficult one. From the stream valley now a focus on the flanks, that's what the road… Where to look for it'

'[7] Okay, what is the concept of a climate-robust stream landscape? How do we see that? We want to make the transition from: it is not just about the stream, the watercourse, but it is about the much broader concept. Namely, also the flanks, the wider valleys, the higher sandy soils where the infiltration takes place, etc.'

Another common given climate related information theme is about the degree to which you can be climate-proof. It is argued to be impossible to be totally, for a 100%, risk-free. There will always be a small risk that there effects of the changing climate are noticed. This statement influences the adaptive capacity supplies, since it argues that it is impossible to protect an area against all climate consequences. Therefore, an area can never be totally climate-proof. The quote below contribute to this information-theme.

'[12] Look, completely climate-robust will not work. There will always be climate effects that will affect you. We should not have that illusion. It is about being able to deal with it.

Leadership

As argued in the theoretical framework, the dimension of leadership in van den Brink et al. (2014) is a dimension that drives for change. It is argued to be a dimension which shows the

right example of how things should desirably go. When leadership is identified, it could give a glimpse towards the desired end-state. Within this dimension, visionary-, entrepreneurial-, and collaborative leadership are the indicators (van den Brink et al., 2014). By focusing on this indicator, two theme emerge. The demanded leadership and the intended leadership are the identified themes. As such, a corresponding dependency with the process of The Guide is identified. Since it is currently on pause, there is mainly a demand for leadership. This should result in taking the lead and show action within the challenge. Despite, still some forms of leadership in the current situation can be identified as well. For instance, when making use of the layers approach, the province is taking a collaborative leader role. As explained by van den Brink et al. (2014), this form of leadership is about bridging gaps and building coalitions. Through the layers-approach, the province is considering multiple perspectives. In all, the landscape perspective, to consider the soil and subsoil; the governance perspective, to consider different stakeholders; and the perspective to consider the people, planet, and the profit, are part of this approach. It is argued that this is a way to practice collaborative leadership. This layer's approach is originally from the Environmental Vision, and because of this, when developing The Guide, they used this form of leadership. Moreover, it can also be argued that the province took a kind of visionary leadership in the developing of The Guide, since the first initiative of development came from the province. Therefore, the visionary leadership entails the content of The Guide. Finally, an entrepreneurial leadership can be identified too. Van den Brink et al. (2014) defines this form of leadership as the leadership to get things done. By shining this knowledge on the dataset, it becomes clear that when there is a responsibility for governments, this government takes this entrepreneurial role. For instance, this role is practiced by the province in view of nature and biodiversity, since these topics are decentralized towards the province. Despite, this is not the case for the climate-robust stream landscapes and therefore, no entrepreneurial leadership role is identified in the dataset. The quote below is a contribution to these statements.

'[16] Well, the province of Noord-Brabant has done it in a very good way by looking at Brabant from a broad perspective in the first instance. They really wanted to put this on the map. With the very broad view, everyone should sit at the table who has an interest in it. So, I do think that the province really does play a leading role in putting these kinds of topics on the map and encouraging the water boards and municipalities to do something with them'

Another theme emerging from the dataset it the theme of the desire of leadership. It is argued that the three pilot-projects in The Guide differ a lot of each other in relation to their process. This is partly elaborated in table 6, with the explanations of the novelties. A year after publication, a sort of evaluation was published in the form of a note (The Guide 2.0, novelty 6 in table 6). Although this note, after a few years no actual successor of The Guide is developed yet. This causes the theme that there is a demand for leadership within the topic of climate robust stream landscapes. The dataset clarifies that if there is a successor of The Guide developed, this should be initiated by the province. As an area-wide organization, the province could take a collaborative leadership role to create the successor. This is specifically a role for the province since municipalities and water authorities are tied to their own territories. As such, the province should elaborate this role from the layers-approach into the stream landscape challenge. Within this role, the province can create cohesion between water authorities and municipalities. The quote below supports this statement.

'[2] What I just said: if there is a party that can do some sort of coordinating role or do something jointly, then that is the province. You should not put that down with a water authority; they have other interests'

To this extend, the visionary leadership comes to focus too. Originally, The Guide is developed to start the transition to become climate-proof by 2050. When the province is taking a collaborative role in this transition, it is argued that they should consider this long-term goal as well and keep it sharp to the attention. Because of this, an interwoven form with a visionary leadership emerges. The quote below supports this statements.

'[11] I think the province should bring cohesion between all municipalities and all water authorities. Because some things also overlap… Yeah, some streams merge into other areas. I think the province should make things coherent, but also keep that long term objective sharp. So, guys: in 2050, we have to do something!'

Furthermore, the demand of an entrepreneurial leadership is identified in the dataset as well. For instance, novelty 4 of Table 6 specified a desired future for the Tongelreep stream landscape. However, it is argued that to be able to act, administrators are necessary who direct the civil servants. Within this specific project, there is currently no organization who takes this entrepreneurial leadership role. It can be argued that because this leadership role is not directed towards an organization, this project is on pause as well. As a regional government, it is argued that the province could take up this role, since they hover over all the areas. In addition, such a leadership role can support by the provision of resources as well. For instance, to facilitate and stimulate involved stakeholders through subsidies. The indicator of resources will be later elaborated in this report. The quotes below supports this desired entrepreneurial leadership.

'[4] The province should think about their role. It is just obvious that there needs to be a leader. The province could do that: no longer a director who is being hired, but the province itself. As the leader of the project. Another role that the province could take on is a role with subsidies. To help that way. In any case, the role is not clear yet, but should become clear when the new phase of the project starts'

Although there is a demand for various leadership roles for the province within this challenge, some contradictions are identified in the dataset as well. It is argued that climate change adaptation is pre-eminently a theme which should be picked up by multiple parties. Therefore, it depends per situation if the province is the best organization to take a leadership role. Furthermore, it is argued that the role of the local community is important within the transition towards climate-robust stream landscapes since these stakeholders are close to the source. For instance, a farmer is quite depending on what happens with the water system in its surrounding. Such local actors should therefore be able to take part decisions-processes, because they depend a lot on what happens with their environment. To this account, it is argued that the government should only engage in framing and supporting, not necessarily with the implementation. Moreover, it is argued that if the province takes a leadership role, it should be aware that it does not take over the role or responsibility of other organizations. The quotes below supports these contradictions towards earlier mentioned desired leadership roles.

'[7] The leadership is a bit of a… I do not think that this is a good term. Climate adaptation is pre-eminently a theme that you must tackle with many parties. Taking charge is a bit tricky in this regard, it also depends a lot on the topic'

'[2] The only one that can hang above is the province. That does mean that we must do something about it and at the same time prevent us from taking over the role of those projects'

Resources

Finally, the resource-indicator from the article of van den Brink et al. (2014). This indicator clarifies what is needed for adaptation efforts to succeed. When detecting the resources within the dataset, it should become clear what is needed to accomplish the objective, and therefore how it possibly should look. Within this dimension, financial-, human-, and authority resources are the indicators (van den Brink et al., 2014). An emerging theme to this account is the theme of desired resources within the challenge. Accordingly, some current resources of The Guide are identified too. To start, it is argued that when a document of a government is published, it often means that it is accompanied with some financial support. Moreover, when publishing a vision, a government gives some guidelines where other organizations should contribute to. In other words, The Guide is a source which puts the challenge of the stream landscapes on the agenda and therefore, it contributes to informing and awareness. Overall, with the current situation of The Guide, it can be argued that authority- and financial resources can be identified. Financial resources are a form of financial support, and this is for instance a subsidy. In addition, van Gupta et al. (2010) clarifies authority resources as a political and legal mandate. Therefore, by publishing The Guide, the province provided a political foundation for the challenge. Below, a quote which support these statements.

'[6] An advantage of vision documents for provinces is that often funds are also released. It is not just the picture and talk. But it is also worth something to the province. This is also important for a water board and other parties. From: "Gosh, okay. So, there are also financing options for the plans…". It's not just policy. It is policy with a certain financial contribution'

<u>The desired resources</u>

Turning to the biggest theme of the resource-indicator in the dataset, the desired or demanded resources. Accordingly, there is a need for resources. The dataset clarifies that only through collaboration, transition can be accomplished. This has to do with resources, since there is a difference in the available resources between different levels of government. For example, small municipalities have less resources available compared to bigger municipalities. Examples are capacity in the form of employees, knowledge, or financial possibilities. Through collaboration between levels of governments, and therefore, exchanging, and gifting resources, such transitions are still possible to accomplish. The quote below supports this first statement of the desired resources.

'[2] If you ask, for example, the municipality of Zundert to adjust the stream landscape at the Aa or Weerijs, they cannot do it alone. They do not have the manpower for that, they do not have the finances for that, they do not have the brainpower for that, they do not have the knowledge for that. I don't know who it has though, otherwise it seems like we do. But you can help them anyway'

To this extent, financial-, human-, and authority resources are demanded within the whole stream landscapes challenge. For instance, as a regional government, the province is in contact with many different sectors and organizations. Therefore, it could support others with human resources. Examples are referring contacts to others or collecting knowledge. Furthermore, the pilot-projects of The Guide are mentioning provincial support through financial resources. Finally, within the process of The Guide it is argued that the province could support by just make decisions. To this extend, there is a demand of authority resources. For instance, by referring to policy or guidelines. Below, some quotes which support these statements.

'[15] And the governments must ensure that the right rules of the game and good financial frameworks are also included. But that is by no means the case'

'[4] The Guide does not go any further, no decisions are made with it and that is a pity. Then you can no longer use it in such a conversation with a farmer. As a result, this guide is no longer used'

'[10] The province has of course a number of contacts, which can be very useful. The province may also have some money if needed. It is an international project because it also crosses borders. That is why it is also useful if you have a higher government than just a few municipalities. It's easier to do something internationally. So yes, I think there are some advantages to that'

4.2.3. Communication Tools in the Semi-Structured Interviews

Not surprisingly, in this part of the analysis important indicators are based on the theoretical- and conceptual framework as well. It is argued that The Guide is a form of a climate-service as it has corresponding characteristics. In addition, each of the features of the CID-framework of Raaphorst et al. (2020) are projected on the dataset and this brought knowledge to mind which will be explained in this paragraph. Although the information-indicator is part of this framework as well, this indicator is already explained properly within the paragraph of the adaptive capacities. Therefore, in this paragraph there will be solely a focus on stakeholders, purpose, and visualization.

Stakeholders

First of all, the indicator of stakeholders. In the article of Raaphorst et al. (2020), this indicator is explained by that climate services are developed to communicate the included data towards the stakeholders. The success of a document depends on the manner to which it will be anchored in the perspectives of stakeholders, and therefore, involving the right stakeholders is of importance (Raaphorst et al., 2020). When this indicator is shone over the dataset, the involved stakeholders of the study should become clear. This should clarify what role and interest stakeholders have within the challenge as well. To describe this in a clear way, Table 7 is developed. It includes for each involved stakeholder its responsibility and interests. All information in Table 7 is conducted from the dataset. Below the table, a couple of quotes are stated which support Table 7.

Stakeholder	Purpose involvement	Responsibility/ perspective/ interest
Province	The province initiated The Guide and is seen as the government-organization to take the next step since they have a regional interest, above all other stakeholders. The interest of the province is that it is argued that the stream landscapes are part of the solution to become climate-proof by 2050.	The province is able to connect different stakeholder, since its wide interest over the whole region. In addition, a government possesses knowledge, and therefore, a perspective. Accordingly, this creates a responsibility to raise climate awareness among stakeholder who are not yet aware about this challenge, or whom awareness can be improved. Furthermore, the especially the province is able to facilitate others. For instance, with guidelines by the development of adaptive visions.
Water authorities	Three water authorities in Brabant where part of the development of The Guide. They are involved since water authorities are responsible for the streams itself.	Water authorities used to have a perspective focused on technical solutions. However, with challenges like the stream landscapes, such a perspective is switching towards more

	Because the province of Noord-Brabant consists mostly of stream landscapes, the interest of this stakeholder group is argued.	landscape-oriented perspective. Moreover, a water authority is a government which is good at doing projects in the field. They are much more of an execution organization than for example the province. Therefore, they are often involved in projects which have to do with stream landscapes. They are the governmental organization with the interest and responsibility.
H+N+S, landscape architecture	H+N+S is a landscape architect-company which helped to develop The Guide. This stakeholder considers the water-system, the spatial area, and the cultural-historic values. Since this is an external organization, it did not have any local interest and therefore, it had an open and uninhibited view on the challenge in Brabant.	Within the challenge, the perspective of a landscape architect is of interest since it includes landscape-values within the process. In this way, not only the water quality and quantity are considered, but the culture-historic values, the spatial quality, and values of different functions as well. This perspective magnifies the current methods and perspectives.
Farmers/ ground managers/ local citizens	This is a stakeholder group who often have local land. It is partial on the land of these stakeholders where developments should take place. In addition, these stakeholders live, work, and recreate in the stream landscapes of Brabant. In a way, there will for sure be influenced by measures taken in this landscape. For instance, famers have interest in a well-functioning stream system because this affects the water availability and thus the fertility of their soil. Or when a stream valley is redesigned, it is possible that there is now place for recreational routes, which is of interest for visitors of those areas.	The perspective of this stakeholder group is practical and concrete, not abstract! With abstract objectives, these stakeholders cannot do anything since objectives such as becoming climate-proof do not incite for action. For instance, the objective of transforming towards a climate-robust stream landscape. Within this objective, it should be made clear what the local involved stakeholder could do to achieve this goal. Does the farmer need to mute ditches? Should a resident of the city disconnect its rainwater from the sewer? This stakeholder group need some practical objectives to be able to contribute towards it. In all, these stakeholders have their own responsibility, since it is argued that the government cannot prevent and protect each climate effect forever.
Municipalities	Besides the local non-government stakeholders, it is the municipality who possess the land as well. Therefore, they are closely involved within local activities. In addition, this stakeholder has the spatial instruments. For instance, a zoning plan. Finally, municipalities have interest in the topic since they will notice the effects of the changing climate. In the end, it is their street or their land that will overflows or dries up because of the changing climate.	Since the municipality has a big part of the spatial instruments, and therefore, a big influence on what happens within the stream landscape, they need to approach such challenges integral. For instance, an employee of the spatial planning department of a municipality should cooperate with an employee of the soil- and water department when a new neighborhood is created. This creates integrality, which is argued to be necessary in this challenge. Furthermore, the municipalities have the responsibility to protect the area and its citizens. Therefore, this stakeholder should take measures to keep them safe.

Table 7: table which describes all the involved stakeholders in the process of The Guide.

'[7] There are many parties. Municipalities, of course. Those are very important, maybe the most important one. Or various social organizations, such as the ground managers, nature-environmental organizations. Agriculture is of course an important player. In Brabant, for example, ZLTO. And yes, also the citizens themselves'

'[15] Brabant consist for a very large part of stream systems. And in those stream valleys and within the stream system, there is simply a lot of agricultural land. So, the importance for us, certainly with a well-functioning stream system lies in the availability of water and the fertility of the soil. That is crucial for agricultural land'

'[3] But that is mainly because the province has to do something from the perspective of natural-policy. Furthermore, everyone has their own thing that they are good at as well. And obligations. The water authorities are generally quite good at doing concrete projects. The province, expect for some departments; is often a policy organization. That is much less focused on to do something in the field. That is where collaboration fits well. But to do something in the field, policy must be made; because otherwise, you cannot do anything'

In addition to Table 7, it becomes clear that responsibility is an important notion within the whole challenge. It clarifies which party is responsible for what action. Furthermore, another theme within the context of stakeholders in the dataset is identified. This is about the collaboration within the process. It is argued that collaboration is of upmost importance. It is not only coming back in the layers-approach of the province, but something which comes back multiple times as an important theme in the process of The Guide as well. For instance, part of the transition towards the future should be about a transformation within governments and the way how they work with each other. To this account, there should be no difference between the perspective of a water authority or the perspective of a province on a specific stream valley. There should be one story and the governments should work together to achieve the objectives within such an area. Eventually, they all contributing to the same goals within the same areas. Moreover, through collaboration, co-creation is possible and through such a method you make sure that all necessary stakeholders are involved. Therefore, the transition towards a climate-proof future should consist of a co-creation method. The notion of collaboration leads towards the notion of effectivity as well. For instance, when multiple governments within a stream landscape collaborate, the best spot to retain water can be collaboratively assigned. In this way, a government upstream can help prevent floods for the government downstream, which is more effective than when the government downstream interfere. As such, this argues for collaboration, to be able to create such effectivity. Below, various quotes support these statements on collaboration.

'[5] And what that road will look like is still unclear because it is gradually being created? Indeed! And you create that together. Co-creation. Creating social added value through co-creation'

'[9] Not linear. A road with bumps. But linear in the thought formation that you have 'one government'. That as a government you also must go to that citizen as 'one government'. Citizen should not be bothered by the vicissitudes within a municipality or within a province. You know, there just must be a front of officials there; province, water board, who simply make a story'

'[14] I also think that it is important to jointly consider what is the most efficient and where we can get the most. So, not necessarily look within your own borders, but within a stream valley. It is about looking together where the best place is to temporarily hold water. During peak showers and things like that. I think that a lot of social costs can still be saved there, so as not to keep the boundaries too tight. But above all to look for effective solutions'

Purpose

The indicator of purpose is part of the CID-template as well. The purpose of a climate service in relation to its stakeholders should be clarified, to prevent it to be misunderstood (Raaphorst et al., 2020). By shining this knowledge on the dataset, it should become clear what purpose the dataset defines towards The Guide as a climate-service. In short, multiple purposes of The Guide are identified in the dataset. First of all, the purpose of creating awareness is mentioned. It becomes clear that raising awareness consist of a couple of themes. Accordingly, raising awareness is created by increasing the knowledge on a topic. For instance, the purpose of The Guide for water authority Brabantse Delta was to clarify that solving drought problem is more then only doing something with your streams. Within this account, The Guide provided information about the importance of the whole stream landscape. Through the provided information, awareness was raised. Moreover, raising awareness contributes to the extent of recognizability too. By developing a document as The Guide, organizations share their thoughts and doubts, and this creates recognizability. Since The Guide in a result of collaboration between different organizations, the involved organization now know what other stakeholders think about the stream landscape. By providing this recognizability, the organization become more aware of the importance of such topics. Furthermore, The Guide aims to clarify that climate change is really happening and by publishing it, awareness on the topic should increase as well. This part of raising awareness has to do with creating realizability. Finally, a last topic which has to do with the purpose to create awareness is that The Guide ensures inspiration. As such, it can be used to inspire other stakeholders or can be used by other stakeholders to refer to as inspiration how things could go. Quotes which support this purpose, to create awareness, are stated below.

'[9] And another goal is awareness. Some awareness of climate change. A part of the realization that you must adjust in your stream, in your stream system to ensure that you retain water. So, when there is too much water you do not get wet feet. And that is good implementation for horticulturists, for businesses that can anticipate this. And they also must work with that. That means that you also must come up with other crops. But what I said, space in that stream does not only mean in the valley. That also means that you must go out onto your banks, into the landscape, to create things there'

'[10] It always helps if you have a document that you can reference and show that, look, this is what we mean. This is what we should be working towards. When I had known the guide earlier, I might have used it in such a way, to inspire other'

'[6] It is recognizability. In the sense of, we know from each other that we should find this important together'

Besides the purpose to create recognition, the purpose to create commitment and to create a start of change is identified as well. It is argued that The Guide was one of the first in its kind and therefore, created commitment to reach the objected goal to have climate-robust stream landscapes by 2050. By creating such a document with multiple organizations, commitment and a support base is created. In turn, this ensures that organizations become part of the transition towards the desired objective. A couple of quotes below supports this purpose.

'[13] That was a kind of first document that acknowledged many of the challenges in the spatial sense that we encounter in the province, which will in any case also be concentrated in those stream valleys. So, it was a kind of a starting product… We are laying a kind of groundwork, which is the basis to continue from here'

'[16] Yeah, I think we were one of the first in the Netherlands to make such a document. And I notice that tackling the streams has now landed throughout the Netherlands. So, also in the Netherlands, for example, it is much more involved. Maybe it has been noticed for a while, but I had the feeling: that it was going to play an important role from there on'

Visualization

Finally, the indicator of visualization will be elaborated. The article of Raaphorst et al. (2020) argues that the quality of visualization of climate services contribute to the extent to which the goal is achieved. Therefore, a closer look to the visualization of The Guide is taken within this study. To start, it is argued that such a document should inspire to get started and such inspiration is not reached when you write a policy document of over 100 pages. Through storytelling or elaborate on figures, such inspiration is argued to be reached. When studying The Guide, this is identified as well: it is not a document of 100 pages. The Guide is based on graphs and pictures through which the whole story is told. Moreover, another theme which can be identified from the visualization of The Guide is that it includes rough maps of what the ambition of such a document is. It is argued that such visualizations are often abstract; not practical and that results in that you cannot disagree with it. The quotes below support this statement about visualization.

'[7] It also has to inspire to get started with it. For example, you can very strongly write a document… A policy document, but you can also present it in a different way, via storytelling. Or in another way visualize it, so that it inspires the parties to get started with it. Because let's face it, a 100-page policy document is very rarely read. But the moment you can visualize that whole idea and those building blocks in a kind of story, storytelling, which is, so to speak, in a 5-minute video… Then you know for sure that it will be seen and read a lot more as a policy document'

'[17] There are always very nice pictures of what the landscape could look like. There are always cards in it; be it rough. So, they are rough cards, so more about ambitions. So, I recognize a lot of photos, images, cards. That is what is often in it. Then several cases… Well, you see that indeed. And then conclusions and follow-up… yes. {Meanwhile, scroll through The Guide}. If you, and I always think that's funny, when you look at these kinds of documents… Anyway, if you look at our reports, they all look the same. But I also mean: the elements are often the same. So: maps, visuals, photos, a sketch of what it might look like in the future, just very crude. So often quite abstract, you know. You can't really disagree with it'

4.3 Case-study - Focus Group Discussion

To elaborate and enrich the data obtained from the semi-structured interviews, a focus group discussion is executed. The discussion mainly focusses on the application of the findings in practice, and it enables to evaluate the findings of the semi-structured interviews. The group discussion is held with employees of the province of Noord-Brabant, since this is the case-study of the research and since these participants are committed towards the goals of the province. Furthermore, the group discussion consists of statements which are elaborated from the results of the semi-structured interviews. The statements can be divided into three different topics, namely: The Guide, objectives, and the way of working. During the group discussion, the participants had the chance to response to the statement and clarify if they agree or not agree with it. A summary of each statement is provided in this chapter. To support, quotes of the participants are stated. The list with participant-functions and the corresponding participant-numbers are described in table 5.

4.3.1 Statements about The Guide

Statement 1: The three pilot projects have been set up and together they have resulted in the guide, after which they all have gone their own way, with own strategies and processes. For the future, it is necessary to bring the pilots together again.
The participants argue that it was never the purpose of The Guide to bring the projects together. The purpose of the guide is stated to be inspiring; in a way that you go into an area, look around and write down what happened. It is therefore questioned what the use would be to bring them together. Besides, it is stated that it is almost impossible to bring them together again. Each project differs in its phase, process, and strategies. Because of this, it seems to be impossible to bring them together. A blueprint is never consistent, since what works in one project, will not specifically work for another. Although this position and thoughts, it is argued that another form of merging is possible. This merge should be based on what you learn from the projects. By bundling lessons learned and sharing these lessons, one could learn from another. Through this merge, conducted knowledge can be exchanged between areas. This is beneficial since the same subject do not have to be reinvent multiple times. In all, this statement should be improved by clarifying the definition of merging the projects. A possible merge could be based on lessons learned.

In addition, the question of 'of whom is the guide?' comes to focus during this statement. It is argued that The Guide is not solely of the province: it is produced in collaboration with other parties. Although, the province is still argued to be the best organization to initiate the step of lessons learned, bundle them, and publish them, so the whole province can learn from it. This position can be explained by the great interest of the province in the challenge. Besides, this initiative is not initiated by municipalities or water authorities since these organizations are bounded by their own area. Moreover, the topic of successor of the guide is discussed as well. Since The Guide made use of pilot-projects, it was possible to have some sort of experiment. The pilot-projects should be evaluated. Questions as *'are we doing it well?'* and *'what could be better?'* should be answered to be able to improve the pilot-projects and use the knowledge of the experiments in other areas. This brings the notion of monitoring and evaluation to focus. It is argued that monitoring and evaluation is needed to enable learning and in turn, enable to improve the transition towards the future. According to the participants, monitoring is not a task the province is doing well. This could be clarified since such projects are often conducted by water authorities and municipalities. The province is less involved by monitor-projects. Despite, participant C argues that this is still partly the responsibility of the province, since no other organization takes the monitor-task for the entire area of the province. Quoting participant C: *'[C] Are we the ones who should be doing this {monitoring and evaluating projects}? I think partly we do, because no other organization is going to do this and we are the only ones who cover the whole of Brabant and have the greatest interest in ensuring that not only the three pilot stream valleys, but at some point, all stream valleys become climate robust. But we never really said it that way'.* In contribution, participant A argues that the province is good in producing pilots and then do nothing with it in the future. This happens in the process of The Guide as well; other parties are guiding the process now. However, it is not the position the participants demand for the province, and this argues the position of the province within the process of the successor of the guide.

Statement 2: The guide has been public for a couple of years now, and the pilots have grown and continued in the meantime. The province made some progress after the guide, which could be seen as a follow-up of the guide. These follow-ups are: 'bouwstenen' and 'GGA'. Taken these steps together, they provide a useful first step towards 2050.

It is argued that The Guide is not the offender of these steps mentioned in the statements. Rather, it was the Environmental Vision of the province, published in 2018. The Guide was a tangible product and shift towards another approach, intended in the Environmental Vision. This new approach is what is meant with the layers-approach. The Guide can therefore be seen as part of the process of the Environmental Vision. In addition, by taking a position in the statement, the steps are argued as useful. Despite, it is clarified that there is currently no coordination between them. Quoting participant: *'[C] Some things happen by chance, some things do indeed come from one kind of vision, and others from something completely different'.* Hence, the question arises how this coordination is remained to know if the right direction is taken. Another question that arises is about the appropriate interference as a province in certain areas. This has to do with responsibilities and interests. Thus, the steps in the statement are useful However, it of importance to put things in order and to relate it to each other.

In addition, leading principles of a climate-proof and robust water system are involved in the mentioned steps. Within the collaboration with water authorities, the province makes use of these policy documents. This contributes to spread knowledge and awareness on the challenge and thus clarifies the usefulness of the steps. However, participant B refers to the challenge which occurs when these steps are translated into implementation. It becomes clear that although GGA is greatly implemented in agreements and collaborations, they are of no use when they are not implemented in practice. Participant C contributes by arguing that everyone agrees in the planning phase. However, only in the implementation phase the interests become clear and these interests are not all equal. This is where the difficulty arises in the transition towards practice and therefore, this is a challenge which occurs often. This challenge is partially caused by the capacity of organizations. It is therefore argued that solidarity is an important notion, to help each other when the capacity requires it. Hence, it is important to produce adaptation programs in collaboration. The importance of collaboration is stated, as this ensures that government-organizations talk to each other. In this way, it is clear what other organization mean and how others look towards a topic. This clarifies the priorities in a challenge and by incorporating this in adaptive programs, the outcome will be improved. For instance, when municipalities, water authorities and the province are in an ongoing conversation, this will rather lead to a shared perspective or awareness on different interests. It is argued that it does not matter that there are multiple interests within a challenge as long as you keep in contact.

<u>Statement 3: It is not necessary for all municipalities to know exactly the guide and its possible successor, as long as they know that there is a problem within the stream landscapes of Noord-Brabant.</u>

The participants state that it is not 'the problem of' the stream landscapes; it is more that the stream landscapes of Brabant are of interest in view of climate-resilience. In view of this statement, contradicting opinions emerged. Participants A and B argues at first that it is not necessary to know The Guide or its possible successor, as long as the stakeholder is involved and collaborate in approaching the challenge. By contrast, participant C argues for a coherent story, such as The Guide or its successor. It is clarified that municipalities are often focused on their own area. Moreover, the focus is mainly on the urban area compared to the rural area. The rural area is sometimes not of big importance. Besides, municipalities know the water systems within the city well, while they are less familiar with their place within the whole catchment area. To have a common story is therefore beneficial. It creates coherence by which awareness on this challenge can be improved. Moreover, it contributes to clarify the position within the whole catchment area. By directly quoting participant C:*'[C] No, you don't need The Guide,*

but yes: you do need some sort of joint notion of where is this going? Or what do we actually have together?'. After listing to this contradiction towards their own opinion on the statement, both participants A and B agree.

In addition, participant B state other spatial instruments to create a common dominator. The participant mentions climate-robust zones within the environmental degradation. Such spatial instruments provide a kind of warn-shine or check; when developing in certain areas, this instrument enables a sign so that topics as climate-robustness should be considered. Another example could be that when you are developing a certain area in view of its climate-robustness, a sign is visualized as well, to refer to The Guide as underlying foundation. Participant A does not agree with this contribution. Participant A argues that it is good to have spatial instruments in order to set boundaries. However, the real solution should not be enforced which is done through the earlier contribution. Such instruments should only be there to support. Accordingly, instruments can go about raising awareness as well. After listening, participant B agrees. Participant C contributes by arguing that if such rules are set through spatial instruments, it is risked that developments are only considering those rules and are not focused anymore on the real matter. Thus, to create such an instrument should be mainly informal, in a way that it is not enforced: to create a kind of safety net.

4.3.2. Statements about Objectives

Statement 4: The aim of the province is to be climate-proof by 2050. However, how does this exactly look like? By describing this goal in a process manner, without design indicators, you ensure that multiple adjustments in the transition towards 2050 remain possible. Therefore, the goal must remain process-oriented instead of based on the design.

Participant C wonders what climate change adaptation is. Accordingly, the participant argues that it is not part of an end-state. Quoting the doubts of participant C: *'[C] I always have some trouble with objectives as: we are climate-proof by 2050. Well, if you arrange it well in policy, then you are continually climate-proof. It is about moving along with something what happens. There is a kind of dynamic within it'.* This dynamic is argued to be based on two features. First, there is the feature of climate change which is unpredictable. The other feature is about society and the way society is making use of this world. These two features interact, and this interaction is hard to visualize or describe in only one picture. Despite, it is argued that such an image can be used to set things in motion. Images could support as inspiration, not as a blueprint. For instance, the Environmental Vision of the province of Noord-Brabant is one big image of a possible direction towards the future. Hence, it is argued that process indicators should be supported by various design indicators. However, an indicator suggests that if it is used in practice, that the end-goal will be accomplish. This is not true: each area is different and, therefore, each situation should be studied individually to be able to know which indicators can be used. In other words, an indicator should be adjusted towards a specific situation. Hence, process indicators should be supported by design indicators. It should be made sure that the process does not become the focus, instead of the end-goal. Therefore, images or design-indicators supports to keep this end-goal clear, without enforcing them.

Statement 5: The objectives of the KRW (finishing in 2027) and the objectives of the climate-robust stream landscapes do sometimes overlap. The KRW has the priority in this, because of the obligations attached to it. The objectives of the KRW and the interventions or measures that follow from it, provide a positive acceleration for the climate-robust stream landscapes of Noord-Brabant.

The participants argues that the KRW indeed helps to accomplish the goals of the climate-robust stream landscape, since KRW aims to meet certain demands in 2027. Nevertheless, it is not solely positive. It is clarified that the demands of KRW are invented 15 years ago, and this can oppose in some climate-proof or climate-robust measures. In other words: when you interfere within a landscape, and you base the measures on old habits and approaches of KRW, possibly other measures that take KRW and climate-resilience into account may now be more appropriate. According to participant A, KRW is so much enforced that it becomes more important to take KRW-measures than you consider the specific needs of an area. Nevertheless, it is argued that because of KRW, measures are taken and that is always better than no measures were taken. Participant B contributes to this by stating that it is a difficult statement since there is a kind of a tension between the two. When focus and ambition is set on one goal, it will go at the expense of the other. According to participant C, the toughest legislation is in the lead because of the enforcement. Moreover, participant C argues that the goal is not to comply with KRW, the goal is to remain ecologically healthy waters. Despite the goal, the KRW is often used to comply with the enforced norms. In contract, climate change adaptation is not normative: it cannot be measured, it can only be determined at some point. According to participant C, we sometimes forget the specific challenge and only focus on the legislation. Thus, quoting participant C: '[C] *It is not about those regulations. Regulations serve the purpose: it's about the task! And the task for the KRW is essentially not very different than the task for climate change adaptation. In fact, in the KRW you are also expected to include climate change and its consequences. It's just how we often interpret it'.* In all, KRW was not produced for nothing: the ecological quality was bad in Europe. Thus, there was an urgence for a legislation as KRW. Eventually, this legislation is going to live its own life and the background, which is the original goal, fades. Therefore, it is argued that KRW-objectives keeps away some of the focus of the climate-proof goal of the province. Despite, it takes care that organizations are indeed taken steps that somehow are partly contributing towards the climate-proof objectives, as argued by the participants.

Statement 6: There is a clear connection between the stream landscapes and the high sandy soils of Brabant, which is why you could see the Deltaplan 'Hoge Zandgronden Zuid-Nederland (2021)' as a follow-up to the Guide: Towards a climate-robust stream landscape. In the sense of: from vision to implementation.

Participant A clarifies that the 'Deltaplan Hoge Zandgronden Zuid-Nederland' is the 'Werkplan – Deltaplan Hoge Zandgronden Zuid-Nederland'. Although it is argued that this 'Werkplan' is indeed something one could do with The Guide, it originally is something different. This 'Werkplan' is originated from the water availability. Within this plan, there are a couple of measures responding to weather conditions and this has to do with climate change adaptation. The connection and difference of the 'Werkplan' and The Guide can be best explained by quoting participant A: *'[A] with the 'Werkplan' a general vision is made practically. In a sense that it becomes clear what you will do with it in practice. And with that, it is also a successor or a different interpretation than what you want to do with The Guide. I think you must be careful with seeing those two exactly in line with each other'.* Despite, the participants partly agree with the statement: there is for sure a connection. Therefore, the 'Werkplan' could be seen as a next step of The Guide, as it contributes to implement the ambitions of the stream landscape challenge. In contribution, it is argued that you should be careful to link instruments. When striving for climate robust landscapes, it is something different than implementing the 'Werkplan'. Simply said: the Delta Program is a temporary construction to solve a problem and it is a partial solution of the climate-proof challenge. Thus, to link it with other statements: there is a kind of shared story of what is desired in the challenge.

To reach the climate-proof future, different measures contribute to it. Part of a possible solution is the 'Werkplan', which is a lot bigger than only the objective of the stream landscapes.

4.3.3. Statements about Way of Working

Statement 7: Design thinking is about customization in an area. The area-oriented approach is focused on this as well, and 'KLIMAP' talks about different processes per area too. To achieve this, a director is needed for each stream landscape who directs the process. Adding such a director or tractor for all areas is necessary and feasible.
The participants argue that a director is indeed a positive addition within an environmental process. Participant B states that in practice, it is noticed that actors are quite quickly sectorized. For instance, a municipality is often focused on the city limits as are the water authorities, which are focused on their own area. If you add such a director, who has the overall imagine clear and will support everyone involved, this would be very helpful. The only thing what is being questioned is it is feasible and necessary to add a director for all stream landscapes. Participant C argues that this is not necessary, since in some areas nothing happens. It is argued that a director is needed when there is energy in an area and that an improvement is desired. Clarifying this statement can be done by quoting participant C: '*[C] So, I think when you ask: do you need a director for an area where an activity is taking place, where measures are going to take place or a refurbishment or etcetera? The answer is yes!'.*

In addition, the question of 'who should take up this director role?' has been asked. Participant C argues that it is not always wise to direct this role towards a government-organization. Participant C points at a leadership-theory where local involved actors are taken up this director's role, such as a farmer or a resident. Arguably, this is only possible when the area is not that big. In contribution, participant A argues that when the director is eventually someone from the province, then it is not there to represent the interests of the province; a director represents the interests of all involved actors. It enables to involve the local interests more often, which will become important in the future when the Environmental law comes into force. Moreover, the notion of director comes to focus since it not specifically the right expression to use. The person who takes the lead is occupied with different aspects as: *'what is happening in the area? What are the interests? How can we come across?'.* Thus, this person will mostly have conversations and bring stakeholders together. Within the role of such a person, the aspects of trust and continuity are mentioned as important characteristics. Overall, this person is of added value within areas where something happens, as explained.

Statement 8: To ensure that targets are achieved by 2050, regarding climate-proof stream landscapes, the province of Noord-Brabant will have to take a leading role within this issue, since it is an overarching organization for the whole area of Noord-Brabant. From this role, it can ultimately be determined whether the province will remain the driving force or can transfer this to other organizations.
Participant C wonders what a leading role specifically is? If you aim to pull, this can also mean that you are pushing. The notion of interests and responsibility is brought to the discussion as well. If you want something, but you are not in charge of that topic: who is the leader then? Thus, it should become clear what the participants of the semi-structured interviews mean when they say that they argue for a leadership role for the province. Participant C points at the notion of why there is a need to have the province take on a leadership role as well. What is the background of such a statement? Why do they want this? Is it because they are frustrated since nothing happens? Is that because they feel impotent? Or because they do not have enough capacity? In contribution, participant B argues that the organization with the biggest interest

within a challenge, is the organization who should take the lead. For instance, when there is a challenge related to water, it seems logically that the water authority takes the lead. Besides, participant B argues that the more local the role can possibly be assigned, the better it is. Participant A contributes as well, by stating that the province is an organization which can support others, but not necessarily should take upon a leadership role. By quoting participant A, the best way to explain what a possible role for the province could be is*: '[A] As a province, you can have an interest in ensuring that Brabant is not fragmented and that everyone does not just do their own thing. Then it is sometimes useful to pull that role of leading towards you a bit. And then there's that word again, leading. And I find the latter very essential; that you also have to look continuously after a few years of that it is still correct? Does that still fit that role? Is this the best way to represent our interests?'.*

Participant A makes a final statement about this statement and The Guide. The reason why there still is no successor of it is because there should be an organization who argues that there should one or not; nobody has said that there should be a successor, but also nobody said that there should not be a successor. Overall, the participants argue that the province should not directly take upon this leadership role.

Chapter 5: Conclusions & Recommendations

To finalize this research, conclusions will be presented based on the answers to the research questions. The conclusions make it possible to give practical and academic recommendations.

5.1 Conclusions

The sub-questions and main question of this research are answered in the conclusions. Each question is supported with a link to the conceptual framework, after which the answers are described based on the results of the study.

Sub-question 1: What type of climate data and procedural knowledge do adaptive visions contain?

When looking at the information of the theoretical framework in relation to this sub-question, various indicators are identified to clarify the climate data and procedural knowledge. First of all, the indicator of learning of the Adaptive Capacity Wheel and the indicator of information of the CID-template enables the possibility to detect the climate data within an adaptive vision, by focusing on the knowledge it provides. Furthermore, the MLP and its indicators of niche innovation, novelties, and regime change enables the possibility to identify the procedural knowledge within the document, by focusing on the origin of an adaptive vision and its steps and actions towards the future.

Hence, the reference-study reveals that the climate data of adaptive visions involves the consequences of climate change for the specific area of government. Heat, drought, floods, and sea-level rise are the most common. It is identified that the more local the government, the more specific this description. Accordingly, in the adaptive vision of a local government, often a specific street or square is mentioned with specific solutions or measures. Conversely, state-levels remain very abstract in a way that specific areas or solution-measures are not specifically mentioned. Additionally, it can be concluded that the end-state of the objective of an adaptive vision is quite differently described. As objectives are often described in an abstract manner, the future desired situation remains on an abstract level as well. Overall, no common view on how the desired end-state should look in terms of climate resilience can be identified. Furthermore, by focusing on the procedural knowledge it is clarified that an adaptive vision is often part of a clear line in perspective of a specific government. The steps before and the steps after the vision are described which means that the procedure is something that gradually develops over the years. In addition, adaptive visions have a clear end-goal, mostly with targets proposed to be reached by the year 2050. While 2050 is the most common, there are other dates as well.

In addition, the case-study reveals climate-data and procedural knowledge too. To start, it defines the value of the stream landscapes to the province, and the position of the landscape in relation to the climate challenge. Accordingly, the stream landscapes affect the majority of the province, currently under pressure of the influence climate change has. Because of the current design of the region's stream landscapes, all precipitation that falls often flow directly to the streams. In the case of intense precipitation, this will lead to floods in the stream and its surrounding area. Moreover, because of this new pattern, drought will occur more frequently. Since the water flows straight to the stream, the higher soils and flanks must deal with drought since little water is being held here. As a result, the water cannot be used in times when little or no precipitation falls and thus, the area cannot be protected against drought. This explains

the pressure on the landscape and the climate-data included in the case-study. Moreover, this clarifies that when the stream landscapes are redesigned, water-retaining measures can be implemented and therefore, water could be held on the higher soils and flanks as well. As a result, the climate adaptation challenge in the province benefits from this redesign, as it contributes to averting several consequences. Furthermore, by focusing on the procedural knowledge in the case-study, it becomes clear that themes as climate robustness and climate resilience are originated from the province's Environmental Vision (2018). These themes are apparent in different projects and documents. It can be concluded that lock-inns made it necessary to develop the Environmental Vision and eventually The Guide. For instance, reparcelling causes functions surrounding streams and this made is necessary to develop The Guide, since climate consequences affecting these surroundings. The Guide elaborates themes as climate robustness and climate resilience in relation to stream landscapes. Through The Guide and other relevant projects, these themes are further elaborated into specific measures for the future. For example, following The Guide, the pilot project of northeast Brabant developed a guideline for municipalities that clarify and give possible solutions to the stream landscape challenge. Accordingly, it is argued that this is a novelty of The Guide. Overall, the process of the case-study can be seen as gradually and iterative: the themes are coming back several times, from different perspectives, and this allows them to be reviewed. In addition, the province did also make use of the layers-approach when developing The Guide. This new way of working, where a broader perspective is used and encompasses more than just the perspective and interest of the province, is a standard to be modeled in the future. Therefore, this layers-approach is part of the procedure and will be incorporated in future procedures of the province.

Based on the information and learning indicator it can be concluded that the identified climate data focuses on specific climate change consequences that an area experiences, and the possible solutions there are to protect the area against it. Furthermore, the indicators of the MLP clarify the procedural knowledge, which is about the development of the document. It becomes clear that an adaptive vision is preceded by earlier published documents and caused by lock-inns, and they are often followed by implementation-related documents, which are argued to be novelties. Accordingly, multiple documents ultimately contribute toward accomplishing the objective. In all, the procedural knowledge consists of a clear line on subject which goes from one document or project to the other and the adaptive vision is part of it.

Sub-question two: What are involved stakeholders in the process and development of adaptive visions?

The stakeholders-indicator of the CID-template focuses on the clarification of the involved stakeholders in the climate adaptation process, and this is a contribution towards this sub-question. The involvement of these stakeholders is partly induced by the role and responsibility a stakeholder has within the whole process. Because of this, the indicator of leadership of the Adaptive Capacity Wheel comes to focus as well. When shining this knowledge on the reference-study, it becomes clear that multiple stakeholders are involved within the process of adaptive documents. Government- and non-government stakeholders are mentioned, as are utilities. Altogether, this leads towards a multi-level governance perspective since all stakeholders influence the process and progress of such a document.

The case-study enables a more in-depth view on this matter. It becomes clear that multiple stakeholders are involved in the process. Accordingly, the water authorities, the province, municipalities, nature-organizations, and the agricultural sector are mentioned as most

important within the challenge of the stream landscapes. Moreover, from all stakeholders, different subjects are of importance. For instance, the subjects of spatial planning, water- and soil systems and realization are of importance in a government-organization. Therefore, the case-study points towards a multi-governance perspective within this challenge as well. Furthermore, it can be concluded that the initiative of an adaptive vision and its development comes from government-organizations. Subsequently, in the process after a vision other stakeholders become involved. The case-study, for example, was initiated by the water authorities and the province after which the municipality and the agricultural sector become important.

In addition, the role and responsibility of the stakeholders clarifies the involvement of the stakeholders in the process. The case-study provided this knowledge as the current focus within the process of The Guide is on the water authorities and the province. Eventually, this focus should move towards local citizens and municipalities. The municipalities should become involved as they have the spatial instruments to redesign the area. Therefore, they have the responsibility to be involved. Local citizens are mentioned as well, of whom the agricultural sector as the most important part of this stakeholder group. This group has a lot of farmlands surrounding the streams, and because these properties are often not yet designed in a climate-proof manner, there are great opportunities in view of redesigning them climate-resilience. When both these local stakeholders act in view of climate resilience, change will indeed arise. It is argued that this has to do with the leadership-indicator since this indicator contains the driver for change. Therefore, it can be concluded that the municipalities and the agricultural sector should have a form of entrepreneurial leadership: they should get things done, namely, to act and make the area climate-proof by implementing measures. By contrast, it is argued that the province should have more of a collaborative leadership role to support the local stakeholders by facilitating them and therefore, overcome difficulties. For instance, as a regional government, the province of Noord-Brabant has a broader scope and more capacity in expertise and knowledge. Because of this, the province can facilitate local stakeholders by linking them to other relevant stakeholders through which coalitions are built. In turn, this helps to overcome the challenge. As such, the province should be part of the future transition as a collaborative leader and through that, support the entrepreneurial leaders.

Sub-question three: How useful is the Guide: Towards a climate-robust stream landscape for local involved stakeholders?

This sub-question involves solely the case-study. The indicators of stakeholders and purpose of the CID-template focus on the involved stakeholders in a climate adaptation process and what intention a climate service has. Through the latter indicator, it is identified if The Guide is received by others as intended and thus, it can identify the usefulness of The Guide. Moreover, the three indicators of the Adaptive Capacity Wheel are a contribution towards this sub-question. The indicators of leadership and resources clarify what they currently involving in the case-study and what they possibly should contain for future transition. This contributes to clarify if The Guide is currently applicable, as it identifies if these indicators are demanded or not. The learning-indicator contributes as well through the discussion of doubts. Ideally, when there are no doubts about the future, an adaptative vision as The Guide can be seen as useful. Visa vera, this means that when there are doubts, it is less useful.

The involved stakeholders in the process of The Guide are the province and the water authorities as initiators. The municipality and the agricultural sector are important local stakeholders. When focusing on the leadership and resources indicators, it becomes clear that

there is a demand of both indicators, however, this depends on the stakeholder group. At first, the non-government locale involved stakeholders. It can be concluded that The Guide involves quite abstract objectives while non-government actors need specific objectives to be able to carry them out. This is a discussed doubt as well. As a result, human- and authority resources are demanded and necessary to be able to produce practical adaptive strategies, and to be able to develop the authority basis for such strategies. Both should lead towards a change to more practical oriented strategies. For instance, a farmer cannot just redesign his land while having doubts that the vision will work, since he is depending on it to be able to earn a living. Because of this, practical objectives are demanded to clarify what is necessary to make their land climate-robust while also considering the self-interest of those stakeholders. Hence, it can be concluded that The Guide is not that useful for the local non-government involved stakeholders as it does not state practical objectives and therefore, does not consider the perspective of this stakeholder group.

Although above mentioned demand for resources, The Guide is still argued to be of use when the purpose for this locale stakeholders is considered. It becomes clear that the intention of The Guide is to raise awareness. Thus, it provides indirect usefulness by providing new information on the climate challenge in stream landscapes towards this stakeholder group. To this extent, it becomes clear that government organizations play a role in providing this information and therefore, raising awareness among the non-government local stakeholders on the topic of climate robust stream landscapes.

Therefore, this points towards the importance of local involved government stakeholders. This importance can be explained on the basis that they are closely involved with their residents, that they should ensure the safety and health of their residents, and because they have the spatial instruments to act to make the area climate-proof. It can be concluded that The Guide is of more use for them than it is for the above-mentioned stakeholders. The municipalities can make use of The Guide by basing or referring their next steps within the stream landscape challenge on it. To this extent, The Guide provides inspiration and a tool to raise awareness and commitment. Therefore, a kind of interaction in the usefulness and purpose between the government- and non-government stakeholders can be identified: the municipalities can make use of The Guide as an inspirational document to be able to inform the non-governmental stakeholders. Overall, it can be concluded that by producing The Guide, its initiators took a kind of visionary leadership role in the perspective of the municipalities: the initiators gave an example or a possible view of how you could face the future with The Guide.

Sub-question four: What are important aspects which the province of Noord-Brabant should consider in the future, when using an adaptive vision?

This sub-question involves solely the case-study as well. The three indicators of the Adaptive Capacity Wheel clarify what doubts are there, what stakeholders need within the future transition, and therefore what the province should consider in their future use of adaptive visions. The indicators of novelties and changing the regime of the MLP clarify what is needed to be able to change the current regime into a more climate-proof version. Since The Guide is aiming to contribute towards a climate-proof province, it is argued that this is a change in regime.

To start, it can be concluded that The Guide does not lead towards clear action since it is created on a quite abstract basis. This is a discussed doubt as well since no clear view of 2050 is

available. It is therefore difficult to contribute towards the objective, since it is not clear how this objective should look. As a result, there is a demand for practicality and therefore, this is an important aspect to consider within the future use of an adaptive vision. Because of that, the province should consider improving human- and authority resources in this challenge. When these resources are considered, adaptive visions will be of more use for locally involved stakeholders. For instance, improving human resources in a vision consists of making use of and considering the agricultural perspective while developing objectives and visions. In addition, by adding authority resources, such perspectives can be implemented in the strategies and therefore, become common practice. In all, this involves the transition from being an inspiration towards specific implementations with the use of human- and authority resources.

Furthermore, another aspect to consider in the future use of adaptive visions is the role of the layers-approach. As this challenge is directed towards a multi-level governance perspective, it can be argued that this corresponds to the layers-approach the province of Noord-Brabant is using since the development of their Environmental Vision. Besides, as a regional government, the province of Noord-Brabant has a broad scope over the whole province as well. This enables the possibility to support and assist more local governmental organizations when necessary. Combined, the layers-approach and the regional scope lead towards a collaborative leadership role. This role does not mean that the province will take up the role of implementing, but the role of assisting others and creating a basis to work collaboratively in the future. This lead to the notion of co-creation as well. For instance, the province could take up the role of linking stakeholders or organizations with each other in a way that through collaboration, a challenge is approached. An example out of the case-study is that through this role, the province could facilitate and support the pilot-project in the Tongelreep to get to the next step, as there is currently a demand for it.

In addition, a few novelties that came forward in this study are of interest to consider. For instance, the ‘Klimaatonderlegger’ which came to the attention during the data collection at a municipality. Although this novelty does not originally arise from The Guide, it is a tool which is in accordance with the values of the stream landscape and its desired transition. When the province of Noord-Brabant considers this novelty, which is already in operation in large parts of the province, and takes it into account their role as a collaborative leader, the tool could be of common use. Accordingly, with a tool as the ‘Klimaatonderlegger’, other novelties arising from The Guide could be incorporated too. For example, the novelty of ‘Bouwstenen’ of the province itself. Hence, it can be concluded that the ‘Klimaatonderlegger’ is some sort of a climate service, as it corresponds towards the definition of it by Raaphorst et al. (2020).

Finally, the mentioned aspects lead towards the notion of dare to make choices. To state more practical objectives, it is argued that a governmental organization should dare to make choices and, in a way, become more decisive. Arguably, this is not representative of a collaborative leadership role. However, decisions can be made within the collaboration and discussions with involved stakeholders as well. The only thing that should happen is that someone organizes collaboration and discussion to decide on topics. For instance, a result of this decisiveness could be that a clear and realistic visualization of a climate-proof stream landscape is provided. Accordingly, in the results of the case-study it is argued that The Guide and its related novelties are providing guidance and a beginning for change. This clarifies the dare to make choices as well: the start and guidance is provided, now it is time for the next step!

Main question: In what ways do adaptive visions of regional governments contribute towards regional adaptation goals?

During this study, three ways in which a vision contributes towards regional adaptation goals are identified. First of all, it is based on its degree of directing the future. Because adaptive visions are often originally derived from earlier documents caused in turn by lock-inns, the subject of these visions are determined to be important. Therefore, the subject of an adaptive vision is worth working on. Moreover, adaptive visions are often part of the whole process of a subject and therefore, after publication, further steps are taken which consider the adaptive subject as well. Accordingly, a gradual and iterative procedure can be identified. Hence, by incorporating the MLP within this study, it becomes clear that by using an adaptive vision as a niche innovation, change is initiated through novelties. Eventually, these novelties should be commonly used, and this will lead towards a change in regime. This new regime is in accordance with the climate-proof objectives which are stated in the innovations.

Secondly, when focusing on the degree visions direct towards change, the indicator of purpose of the CID-template is of interest as well. As stated, an adaptive vision has the purpose of raising awareness, commitment, and recognition. Therefore, the degree to which an adaptive vision directs change has to do with the extent to which it is inspirational as well. Ideally, by the explanation of climate-data in a vision, awareness and recognition of the climate challenge will be created, and this should in turn create the basis to start the transition. To create this transition, the different perspectives of involved stakeholders should be considered; when the agricultural sector is argued to be part of the solution, their perspective and worldview should be part of the vision as well. Hence, by providing inspiration and incorporating the right information to the right stakeholder, an adaptive vision ensures that the process continues. It can be concluded that a vision contributes to regional adaptation goals by providing proper information and recognition, which results in inspiration and commitment to greater objectives.

A final way a vision contributes has to do with the extent that measures are implemented. During research, it became clear that it is hard to adopt measures that are known to be successful, because the desired climate-proof status is not yet widely known. By referring to a participant of the research, this challenge is clarified: *'[6] you should go from A to B, with the knowledge and process of B. Therefore, you should develop in a different way than you are currently used to'*. Because measures are often staying on an abstract level, they are hard to implement as they are not quite directing towards specific areas or actions. Accordingly, these measures are not inspiring to work on as well, as explained in above conclusions. This is an emerging doubt in de dataset. Therefore, decisions should be capable of implementing measures. This has to do with the indicator of leadership of the Adaptive Capacity Wheel, and the demand of this indicator. Since the case-study clarified that the multi-level governance perspective is part of the stream landscape challenge and due to legal responsibilities and interests, it can be concluded that a regional government would be best to take on a collaborative leader role. Through this role, a regional government can provide a basis to collaboratively work on challenges and facilitate for a basis where all involved stakeholders discuss the challenge. By considering this collaboration, the possibility exists to develop more practical measures that can be implemented. When basis is created and more practical measures are developed and incorporated in visions, the degree to which it contributes towards greater adaptation goals increases.

5.2. Recommendations

By answering the research questions, it is possible to give recommendations. First, recommendations will be provided for the internship organization: the province of Noord-Brabant. Secondly, academic recommendations will be provided.

5.2.1. Practical Recommendations

The practical recommendations are about actions the province of Noord-Brabant should consider in their way towards a climate-proof future, by using The Guide. Accordingly, these recommendations will be mostly based on the answer to sub-question four. As a product for the province of Noord-Brabant, the internship-organization for this research, an extended version of the recommendations is produced and delivered in Dutch.

- **Transition from abstract to practical**

By studying the content of The Guide, its intention, and the worldview and perspectives of involved stakeholders, it becomes clear that there is an urgent demand for a transition from abstract to practical objectives. This transition is about clarifying objectives, and this should provide a basis to easier implement the suggested measures in the vision. By including human- and authority resources within the future use of the challenge in the stream landscapes of Noord-Brabant, this practical basis should be provided. This has to do with the fact that The Guide is currently not useful for locally involved stakeholders, although they are important for the transition towards the desired future. Human resources are for example sharing knowledge and expertise with other stakeholders, through which a joint product can be designed. By facilitating resources, governments can help to clarify which desires and perspectives a nature-manager has, in relation to climate-robust stream landscapes. Authority resources should provide the basis to incorporate the results of human resources in policy. So, these resources enable the possibility to use the perspective of the nature-manager in future policies. To conclude, it is recommended to consider the human- and authority resources in future.

- **Next steps of The Guide**

In the data collection of the case-study it became clear that there are doubts about the next steps of The Guide. Questions as: *'should there be a successor?*' and if so, '*what should it entail?*', were asked. Therefore, a practical recommendation on this topic is of use, to facilitate the province. By elaborating on the legal responsibility of a province, it is clear that the province should monitor water authorities and municipalities to be able to know if they comply with environmental law (table 2). Moreover, it is clarified that the province has the legal responsibility to convert national water policy into regional measures (table 2). Besides, the data-collection makes it clear that the province is the only government in Noord-Brabant who has an overview of other stakeholders as municipalities and water authorities are both bounded by their own area. When both aspects are taken together, it becomes clear that if the province wants to have a successor of The Guide, they should initiate its development. Although it is difficult to bring the pilot projects together in a successor, it would enable to describe the current status of these pilots. In turn, this provides a clear view on how it could work in view of the challenge of climate-proofing a stream landscape. This clarification can convey as an inspiration for other stream landscapes through which it can gather commitment and spread information. To conclude, a practical recommendation is to support a successor of The Guide.

- **Future role of the province of Noord-Brabant**

The above recommendation on the successor of The Guide leads towards the possible future role of the province in this challenge. Arguably, the province is not really a realization or implementation-oriented organization as this is more reserved for water authorities and

municipalities. However, the above recommendation points towards a clear role for the province as a collaborative leader. This role enables the support and facilitation of involved stakeholders and provides a basis to discuss and collaborate with other stakeholders. In this role, the province could indeed be the initiator of the successor of The Guide. Because of this, the province should start the conversation on the next steps and create a platform where other involved stakeholders can join, in a way to create a collaboration on the challenge. This is a contribution to an aspect mentioned in the answer to sub-question 4 as well: dare to make choices. The province should decide what they want to do in the future, and the collaborative leader is a wise option to consider. The only thing the province should do is decide, and in a way ensure that other stakeholders can move forward as well.

5.2.2. Academic Recommendations

The academic recommendation is focusing on further research, derived from the conclusions. To start, follow-up research on the topic of monitoring is recommended to investigate and measure what documents really do in the long term, in terms of implementation. The notion of monitoring came to the attention during the reference- and case-study. Appendix A shows the code-list, which also clarifies the number of times the code of monitoring was used in the dataset of the semi-structured interviews. Moreover, monitoring was also discussed in the group discussion. Despite this, no clear attention is paid towards the notion of monitoring in the theoretical framework or the literature review. By studying this notion, it becomes clear what visions really do in terms of implementation and progress, despite only focusing on what visions aim to implement or improve. When this notion of monitoring was considered, the study would have been more consistent, and therefore, it is of importance in follow-up research.

Another academic recommendation points towards the uncertainties of the process from policy towards implementation. By doing this research and by conducting an internship at the province of Noord-Brabant, this topic came to the attention in various interviews, meetings, and presentations. Not only on the topic of climate-robust stream landscapes, but also other climate change adaptation related subjects. Based on these experiences, it can be argued that there are many doubts on how to deal with this transition in practice. Although this is a point of the practical recommendations, it is an academic recommendation too. By studying this notion, a relevant societal feature would have been studied which would have been a great benefit for practical use. If this doubt was included in the research, there was a greater emphasis on the indicator of novelties (MLP) and how they were developed. Rather, in this study the indicator of novelties was projected to detect possible future steps and the position of an adaptive vision in a whole process. To conclude, the background of this challenge is something that is recommended in the academic field, as the research will support practice.

Chapter 6: Discussion & Critical Reflection

To close this thesis, a discussion and critical reflection on this research is provided.

An aspect of the discussion is about the relation between the results and the knowledge given in the theoretical framework. By focussing on the relation between chapter 2 and chapter 5, it becomes clear if the expectations in the theoretical and conceptual framework appear in the results of the study as well. When comparing, a few significant notions can be mentioned. To start, the MLP, the Adaptive Capacity Wheel and the CID-template individually and collectively were considered to provide a basis of which this study could built on. By superimposing the description of their indicators on the study, it was expected to detect the indicators in the datasets. Thereby the dataset could be tested against the acquired knowledge of the theoretical framework. Despite each of the indicators of the theoretical- and conceptual frameworks being elaborated in the datasets, in the results, and analysis, they do not have an equal share in the conclusions of this research. This emerged in the following situation: in the conclusion of sub-question one, it is stated that emerging climate-data within adaptive visions involves the elaboration of climate change consequences and its possible solutions. Beforehand it was thought that this part of the sub-question would be investigated by focusing on the learning-indicator of the Adaptive Capacity Wheel and the information-indicator of the CID-template. However, the answer to this part of the sub-question is not in line with the expectation. It becomes clear that this part is mainly answered by focusing on the information-indicator of the CID-template. This indicator on its own already gives a proper basis to answer the question, as it focuses on the data the adaptive vision contains. Despite, this still leads towards the enabling of learning; by clarifying the data, and therefore spreading information, one could learn from it. However, this is not specifically what the indicator of learning of the Adaptive Capacity Wheel consists of since it is more focused on discussing doubts and designating and enabling single- and double loop learning.

Furthermore, when continuing to focus on the Adaptive Capacity Wheel, other differences in the expectations and the results can be identified. Beforehand it was expected that the indicator of leadership would lead to identifying the right example towards the future. Accordingly, in the results it became clear that The Guide is currently on pause; it is not clear yet what specific related next steps could be. As a result, no clear roles of leadership can be identified in the current situation. Despite this, solely demanded forms of leadership or forms of leadership that occurred in the past are identified. Because of this difference between the results and the expectation, results do not lead towards a clear view of how the desired future looks like. Nevertheless, it still contributes to what is desired and demanded to reach this still unclear status. Moreover, these two indicators of the Adaptive Capacity Wheel contribute to clarify the responsibilities and interests of involved stakeholders as well and provide the basis to strengthen the clarification of which stakeholders are involved.

When reflecting on the conceptual model it becomes clear that choices are made which eventually lead towards the results. Within the conceptual model of this study, the MLP, the Adaptive Capacity Wheel, and the CID-template are used and elaborated to be able to study the subject. Within the study, a choice has been made to focus only on a couple of the indicators of the theories, instead of all indicators they entail. Furthermore, obtained results directs to specific indicators instead of others as well. This could cause that an indicator does not have the same share in the results compared to another indicator. This situation has occurred with the indicator of visualization of the CID-template. This template consists of four indicators: stakeholder, purpose, information, and visualization. Reflecting on this research, minimal

attention was given to the indicator of visualization. Using this indicator in the conclusions would have been interesting because the visualization of a climate service influences the extent to which a document inspires to work on as well.

Additionally, a reflection and discussion can be provided on the choices made in terms of the methodology. When this study would have included multiple case-studies instead of a single case-study, light would have shed on the conceptual model in different situations. By doing multiple case-studies, the reliability of the study could be increased, and this would have improved the ability to generalize the findings. However, it is argued that by doing the reference-study, this validity of the research overall is guaranteed. Despite, including more case-studies would have been interesting as it could have provided other perspectives. For example, in this research the agricultural perspective had a big influence. However, it would have been interesting to study the perspectives of natural managers compared to those of the agricultural sector.

Another point of reflection and discussion can be provided on the group discussion. Beforehand, it was expected that the group discussion would elaborate on the first findings of the semi-structured interviews and that it would clarify the position of the province against the statements. Although this aim is partly accomplished, the results show differently as well. Reflecting, the group discussion mostly clarified the first findings of the interviews more broadly, since there were a few misunderstandings in the statements. For example, statement two concerns the next steps of The Guide. Beforehand it was thought that the mentioned steps were developed after The Guide and in a sense, refer to The Guide. Nevertheless, it becomes clear that The Guide is not their starting point. Instead, it was the Environmental Vision. This difference has consequences for the naming of novelties of a document, since beforehand it was thought that for example the area-oriented approach stems from The Guide. Therefore, the group discussion has functioned mainly as a method to check the findings than it was a method to elaborate on the findings. As a result, it would have been of more value if the group discussion was held after the whole dataset of the interviews were analyzed, since the findings would already have been more tailored made by then. As such, this difference in sequence would have improved the outcome of the group discussion.

A final point of the discussion and reflection clarifies what is demonstrated with the conclusions of this study. According to the conclusions, the ways in which an adaptive vision contributes to greater regional adaptation goals is mostly explained through the way it inspires to continue to work on it, and that it is part of an iterative process. The conclusions demonstrate that the importance of focussing on the factor of inspiration is of influence in a challenge as this one. When providing inspiration, involved stakeholders tend to read the vision and therefore, will increase their knowledge on the topic. This will increase the extent to which they are willing to act. According to the conclusions, raising awareness and raising recognition are important features within this inspiration. By making sure involved stakeholders experience these features, inspiration is provided.

Reference List

Agrawala, S. (1998). Context and early origins of the Intergovernmental Panel on Climate Change. *Climatic Change*, *39*(4), 605-620.

Bache, I., Bartle, I., & Flinders, M. (2016). Multi-level governance. In *Handbook on theories of governance*. Edward Elgar Publishing.

Bachtler, J., & Michie, R. (1997). The interim evaluation of EU regional development programmes: Experiences from Objective 2 regions. *Regional Studies*, *31*(9), 849-858.

Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative research journal*.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, *3*(2), 77-101.

Cannon, T., & Müller-Mahn, D. (2010). Vulnerability, resilience and development discourses in context of climate change. *Natural hazards*, *55*(3), 621-635.

City of Melbourne. (2017). *Climate Change Adaptation Refresh*.

Chadwick, A. E. (2017). Climate change communication. In *Oxford Research Encyclopedia of Communication*.

Colombo, U. (2001). The Club of Rome and sustainable development. *Futures*, *33*(1), 7-11.

Cooksey, B., & Kikula, I. S. (2005). When Bottom Up Meets Top Down: The Limits of Local Participation in Local Government Planning in Tanzania.

C40 Cities. (2016). Good Practice Guide: Climate Change Adaptation in Delta Cities. *C40 Cities Climate Leadership Group.* Retrieved November 2020, from: https://climate-adapt.eea.europa.eu/metadata/publications/climate-change-adaptation-in-delta-cities/11303447

El Asmar, J. P., Ebohon, J. O., & Taki, A. (2012). Bottom-up approach to sustainable urban development in Lebanon: The case of Zouk Mosbeh. *Sustainable Cities and Society*, *2*(1), 37-44.

Fridlund, B. (1997). The case study as a research strategy. *Scandinavian journal of caring sciences*, *11*(1), 3-4.

Galarraga, I., Gonzalez-Eguino, M., & Markandya, A. (2011). The role of regional governments in climate change policy. *Environmental Policy and Governance*, *21*(3), 164-182.

Geels, F. W. (2011). The multi-level perspective on sustainability transitions: Responses to seven criticisms. *Environmental innovation and societal transitions*, *1*(1), 24-40.

Gemeente Rotterdam. (2019). *Rotterdams Weerwoord: Urgentiedocument*.

Gupta, J., Termeer, C., Klostermann, J., Meijerink, S., van den Brink, M., Jong, P., ... & Bergsma, E. (2010). The adaptive capacity wheel: a method to assess the inherent characteristics of institutions to enable the adaptive capacity of society. *Environmental Science & Policy*, *13*(6), 459-471.

Gustafsson, J. (2017). Single case studies vs. multiple case studies: A comparative study.

Harrison, H., Birks, M., Franklin, R., & Mills, J. (2017, January). Case study research: Foundations and methodological orientations. In *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research* (Vol. 18, No. 1).

H+N+S. (2018). *Reisgids: Op weg naar klimaatrobuuste beeklandschappen*. Den Bosch, Nederland: H+N+S Landschapsarchitecten.
ICCSR. (2009). *Indonesia Climate Change Sectoral Roadmap - Synthesis Report*.

Keessen, A. M., Hamer, J. M., Van Rijswick, H. F., & Wiering, M. (2013). The concept of resilience from a normative perspective: examples from Dutch adaptation strategies. *Ecology and Society*, *18*(2).

Kleerekoper, L., Van Esch, M., & Salcedo, T. B. (2012). How to make a city climate-proof, addressing the urban heat island effect. *Resources, Conservation and Recycling*, *64*, 30-38

Knieling, J., & Leal Filho, W. (Eds.). (2012). *Climate change governance*. Springer Science & Business Media.

Lehner, B., Döll, P., Alcamo, J., Henrichs, T., & Kaspar, F. (2006). Estimating the impact of global change on flood and drought risks in Europe: a continental, integrated analysis. *Climatic Change*, *75*(3), 273-299.

Liamputtong, P. (2011). Focus group methodology: Introduction and history. *Focus group methodology: Principle and practice*, *224*.

Ligtvoet, W., Bregman, A., van Dorland, R., Brinke, W. B. M., de Vos, R., Petersen, A. C., & Visser, H. (2015). *Klimaatverandering: samenvatting van het vijfde IPCC-assessment en een vertaling naar Nederland*. Planbureau voor de Leefomgeving.

Meadowcroft, J. (2009). What about the politics? Sustainable development, transition management, and long term energy transitions. *Policy sciences*, *42*(4), 323-340.

Moser, S. C. (2010). Communicating climate change: history, challenges, process and future directions. *Wiley Interdisciplinary Reviews: Climate Change*, *1*(1), 31-53.

NOS.nl (2021). *Overstromingen en overlast: hoe kon het zo misgaan in Limburg?* Retrieved August 2021, from NOS.nl: https://nos.nl/collectie/13869/artikel/2389352-overstromingen-en-overlast-hoe-kan-het-zo-misgaan-in-limburg

NOVI. (2020). *Nationale Omgevingsvisie - Duurzaam perspectief voor onze leefomgeving*. Ministerie van Binnenlandse Zaken en Koninkrijksrelaties.

O'Neill, B. C., & Oppenheimer, M. (2002). Dangerous climate impacts and the Kyoto Protocol.

Provincie Gelderland. (2021). Actieplan klimaatadaptatie – Samen op weg naar een klimaatbestendig Gelderland.

Provincie Noord-Brabant. (2018). De Kwaliteit van Brabant – Visie op de Brabantse Leefomgeving – Brabantse Omgevingsvisie.

Provincie Noord-Brabant. (2019). *Op weg naar klimaatrobuuste beeklandschappen 2.0*.

Raaphorst, K., Koers, G., Ellen, G. J., Oen, A., Kalsnes, B., van Well, L., ... & van der Brugge, R. (2020). Mind the Gap: Towards a Typology of Climate Service Usability Gaps. *Sustainability*, *12*(4), 1512.

Rehman, A. A., & Alharthi, K. (2016). An introduction to research paradigms. *International Journal of Educational Investigations*, *3*(8), 51-59.

Republic of South Africa. (2019). National climate change adaptation strategy: Version UE10.

Rijksoverheid (2021a). *Taken van de Rijksoverheid.* Retrieved September 2021, from Rijksoverheid.nl: https://www.rijksoverheid.nl/onderwerpen/rijksoverheid/taken-van-de-rijksoverheid

Rijksoverheid (2021b). *Provincie voert landelijk en eigen beleid uit.* Retrieved September 2021, from Rijksoverheid.nl: https://www.rijksoverheid.nl/onderwerpen/provincies/taken-provincie

Rijksoverheid (2021c). *Taken van een gemeente.* Retrieved September 2021, from Rijksoverheid.nl: https://www.rijksoverheid.nl/onderwerpen/gemeenten/taken-gemeente

Rijksoverheid (2021d). *Taken van een waterschap.* Retrieved September 2021, from Rijksoverheid.nl: https://www.rijksoverheid.nl/onderwerpen/waterschappen/taken-waterschap

Rijksoverheid (2021e). *Waterbeheer in Nederland.* Retrieved September 2021, from Rijksoverheid.nl: https://www.rijksoverheid.nl/onderwerpen/water/waterbeheer-in-nederland

Royal Haskoning DHV. (2020). *Leading by example Rotterdam takes climate action to enhance resilience.* Retrieved August 2021, from Royal Haskoning DHV: https://global.royalhaskoningdhv.com/newsroom/blogs/leading-by-example-rotterdam-takes-climate-action-to-enhance-resilience

Savaresi, A. (2016) The Paris Agreement: a new beginning?. *Journal of Energy & Natural Resources Law*, 34:1,16-26, DOI: 10.1080/02646811.2016.1133983

Steurer, R. (2013). Disentangling governance: a synoptic view of regulation by government, business and civil society. *Policy Sciences*, *46*(4), 387-410.

Swart, R. O. B., & Raes, F. (2007). Making integration of adaptation and mitigation work: mainstreaming into sustainable development policies?. *Climate policy*, *7*(4), 288-303.

't Hart (2021). *Dijkgraaf had nooit rekening gehouden met vloedgolf in Limburgse beken.* Retrieved August 2021, from Nu.nl: https://www-nu-nl.cdn.ampproject.org/c/s/www.nu.nl/wateroverlast-limburg/6147105/dijkgraaf-had-nooit-rekening-gehouden-met-vloedgolf-in-limburgse-beken.amp

Tongco, M. D. C. (2007). Purposive sampling as a tool for informant selection. *Ethnobotany Research and applications*, *5*, 147-158.

Van den Brink, M., Meijerink, S., Termeer, C., & Gupta, J. (2014). Climate-proof planning for flood-prone areas: assessing the adaptive capacity of planning institutions in the Netherlands. *Regional environmental change*, *14*(3), 981-995.

Van Drunen, M., Leusink, A., & Lasage, R. (2009). Towards a climate-proof Netherlands. In *Water Management in 2020 and beyond* (pp. 165-194). Springer, Berlin, Heidelberg.

Van Thiel, S. (2014). *Research methods in public administration and public management: An introduction*. Routledge.

Vlaamse Overheid. (2019). Vlaamse klimaatstrategie 2050.

Whitmarsh, L. (2009). What's in a name? Commonalities and differences in public understanding of "climate change" and "global warming". *Public understanding of science*, *18*(4), 401-420.

Wiek, A., & Iwaniec, D. (2014). Quality criteria for visions and visioning in sustainability science. *Sustainability Science*, *9*(4), 497-512.

Williams, M., & Moser, T. (2019). The art of coding and thematic exploration in qualitative research. *International Management Review*, *15*(1), 45-55.

Zhenmin, L., & Espinosa, P. (2019). Tackling climate change to accelerate sustainable development. *Nature Climate Change*, *9*(7), 494-4.

Appendices

APPENDIX A = CODE-LIST WITH THE AMOUNT OF TIMES A CODE IS USED X
APPENDIX B = THEMATIC MAPS OF PHASES 3 TO 5 OF THE THEMATIC ANALYSIS XI
APPENDIX C = DOCUMENT ANALYSIS FORM OF THE REFERENCE STUDY XIII
APPENDIX D = ELABORATION ON THE NOVELTIES OBTAINED FROM THE INTERVIEWS XXI
APPENDIX E = INTERVIEW PROTOCOL FOR EMPLOYEES OF THE PROVINCE OF NOORD-BRABANT . XXVI
APPENDIX F = INTERVIEW PROTOCOL FOR EMPLOYEES OF THE WATER AUTHORITIES XXVIII
APPENDIX G = INTERVIEW PROTOCOL FOR LOCAL INVOLVED STAKEHOLDERS XXIX
APPENDIX H = INTERVIEW PROTOCOL FOR THE EXPERTS XXX

Appendices which are included in a separated document:

Appendix 1 = Transcripts interviews & group discussion

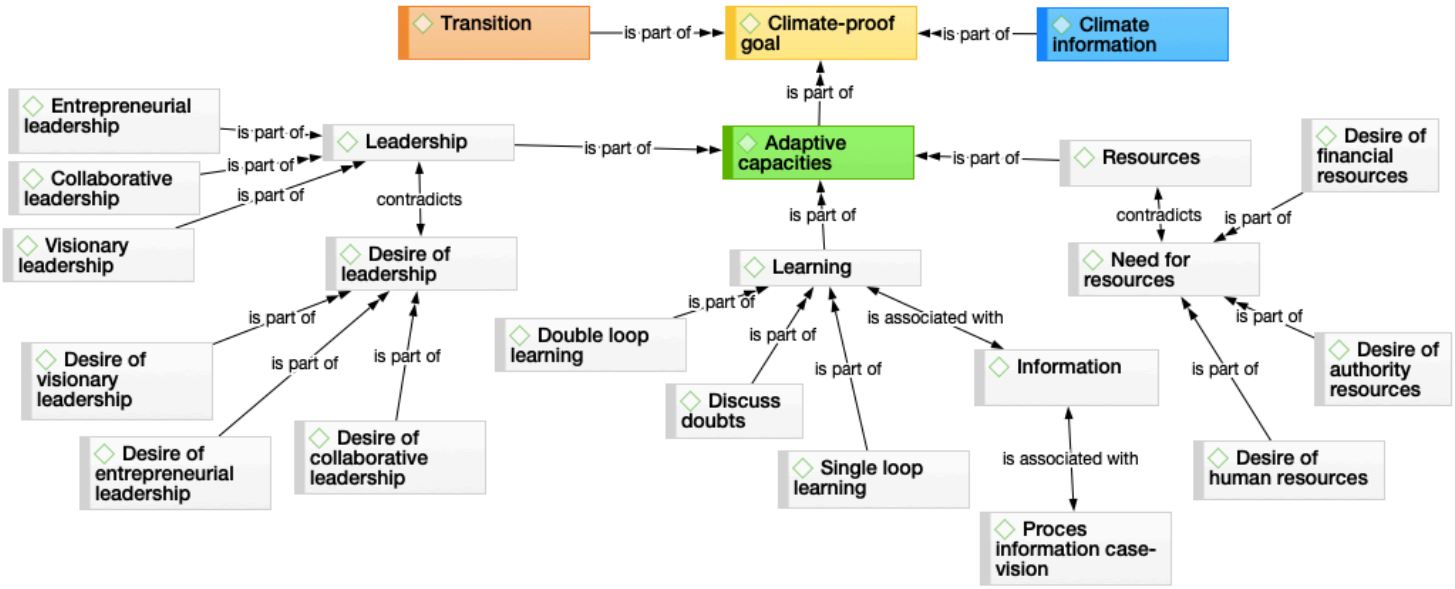
Appendix A = Code-list with the amount of times a code is used

Color	Name	Groundedness	Density
●	Adaptive capacities	0	4
●	Climate information	0	4
●	Climate-proof goal	0	3
○	Collaboration	6	2
○	Collaborative leadership	8	1
○	Communication	12	1
○	Create a start	3	1
○	Creating awareness	17	1
○	Creating commitment	8	1
○	Desire of authority resou	5	1
○	Desire of collaborative le	21	1
○	Desire of entrepreneurial	21	1
○	Desire of financial resour	4	1
○	Desire of human resourc	8	1
○	Desire of leadership	10	4
○	Desire of practialization	8	1
○	Desire of raising awarene	1	0
○	Desire of visionary leade	7	1
○	Discuss doubts	39	1
○	Double loop learning	14	1
○	Effectivity	2	1
○	Entrepreneurial leadershi	7	1
○	Information	31	3
○	Information case-vision	26	1
○	Interests	10	1
○	Interwoven	6	1
○	Leadership	9	5
○	Learning	5	5
○	Lock-inns	32	1
○	Metaphor	9	0
○	Momentum	4	1
○	Monitoring	7	0
○	Need for awareness	2	0
○	Need for resources	2	5
○	Niche innovation	21	6
○	No double-loop learning	1	0
○	Non-lineair	8	1
○	Novelities not specifically	41	2
○	Novelties case-vision	26	2
○	Origin case-vision	5	1
○	Proces information case-	61	2
○	Purpose case-vision	28	4
○	Purpose stakeholder	30	1
○	Resources	6	2
○	Responsibility	18	1
○	Single loop learning	2	1
○	Small adjustments	18	2
○	Stakeholders	15	7
○	Stakeholders case-visior	7	1
○	Start of change	63	1
●	Transition	0	4
○	Usage case-vision	29	1
○	Visionary leadership	8	1
○	Visualization	6	2

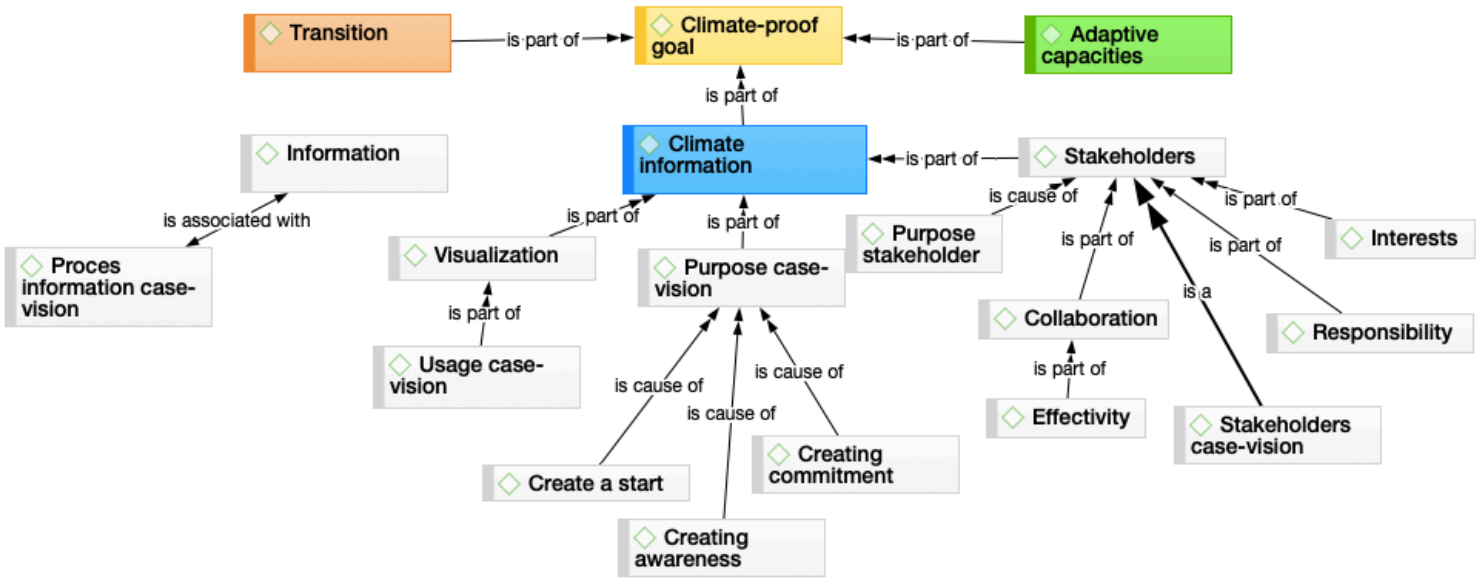
This code-list is produced from Atlas.ti and shows the number of times each code within the dataset of the semi structured interviews is used. It shows the importance a specific theme has within the dataset.

Appendix B = Thematic maps of phases 3 to 5 of the thematic analysis

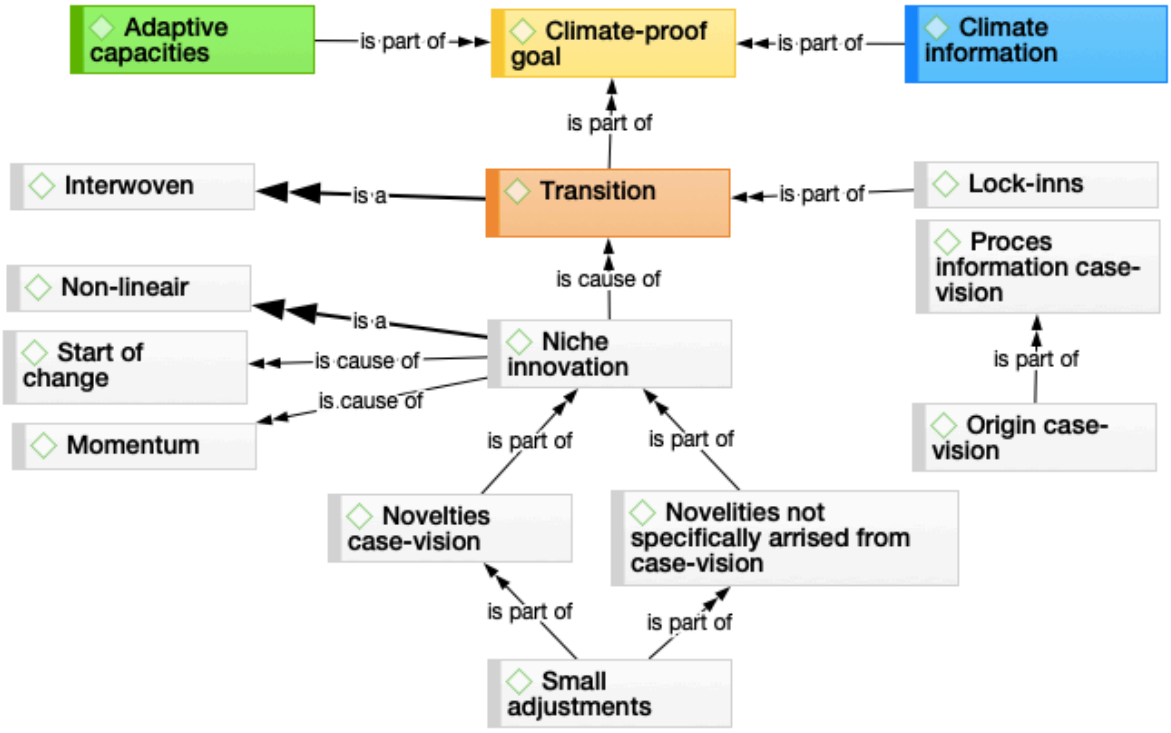
Thematic map of adaptive capacities:



Thematic map of climate services:



Thematic map of transitions:



Appendix C = Document analysis form of the reference study

Document	Content climate-resilience	Content transition	Content climate service
Municipality of Rotterdam, the Netherlands: Rotterdams Weerwoord – Urgentiedocument **(**Gemeente Rotterdam, 2019)	Because of climate change, the city of Rotterdam must deal with precipitation, heat, drought, and floods. This affects the health, economy, and safety of the city. The document is focused on climate-adaptation, to do something about the consequences of climate change. This is necessary since the city is a low-lying delta and therefore is vulnerable to the climate risks. Besides the low-lying delta risks, the city of Rotterdam consists also of peaty soil. This is vulnerable to the consequences of drought-periods and that is why the city also has to deal with subsidence. Subsidence across the city is therefore a consequence of the changing climate. The document clarifies the specific changes in climate for the city. For example: the decrease of cold days, the increase of hot days, and the corresponding consequences. Besides these changes in climate, the city also must deal with changes in society which can be summarized by the transitions of health, circularity, inclusiveness, compact city, and productivity. To clarify the desired future, the climate-proof status in 2050 is described. This status entails the following elements: - All neighbourhoods do have green routes and spots which provides coolness and attractiveness.	The document is a starting point for change in the coming years. The main goal of the document is a climate-proof Rotterdam in 2025. To be able to reach this goal, the document aims to translate the abstract upscaling towards practical measures and actions. The document reaches its goal when residents and organizations of the city are involved and are feeling responsible to prepare the city against the coming climate-change. Overall, the city of Rotterdam did multiple things to get attention on climate adaptation which are part of the transition towards the desired goal. Examples of these steps are the vision and strategy on water management in the city (2008), adaptation program Rotterdam climate-proof (2009), Rotterdam Adaptation Strategy (2013), Regional Strategy water safety and fresh water supply (2014). All of this together led towards the development of the Weerwoord (2018/2019). This document should result in an implementation/ execution program which should clarify which neighbourhoods do need priority in the way towards the goal of the document. Within the transition towards the future, this document forms the basis or frame for all initiatives, big or small.	The purpose of the document is to clarify what the effects of the changing climate are for the city of Rotterdam. It is also an invitation to all involved stakeholders to do something; to act and implement measures. The are other involved stakeholders than only governmental based stakeholders, since 60% of Rotterdam's land is privately owned. This means that the government only have 40% influence on what happens. Therefore, one could argue that only with measures in the public-area, the goals will not be reached. Key to success lies on the private owned areas. The water-robust and climate-proof goal can only be reached when all different actors act. This means: the municipality, the water authorities, the social housing corporations, business, societal organizations, and citizens; they all are needed and must act and work together to reach the desired goals, which are beneficial for all. Because of this broad scope of involved actors, different kind of activities need to be developed: - Only public activities - Only private activities - Combination of private- and public activities. Via the implementation program, these activities will become practical. To make sure the document is published and communicated in a proper way, a

	- The water-quality is ensured and there are multiple spots to recreate, around and in the water, through Rotterdam. - When one of the biggest harbours of the world do develop, sea-level rise is considered, to make sure that floods only happen between 50-100 years. This is an improvement of protection. - Precipitation is processed where it falls. Besides, all buildings built after 2022 can proceed 70mm of precipitation, which is an improvement. - All people and companies in Rotterdam know the possibilities to better prevent themselves against the consequences of the changing climate and they know where they have to go when they need help by climate-proofing reconstructions.		communication-strategy must be set up, which is focused on stakeholders other than the government. Besides, multiple information campaigns will be set up in the coming years which will ensure awareness. Overall, the document is visualized with multiple pictures, maps and graphs in order to clarify the information in an attractive way. The role of the municipality of Rotterdam within this topic is to guide the whole process and facilitates to make ideas and dreams come true. Within the whole process and transition, the municipality is working together with society. Together they set goals, identify chances and take action.
City of Melbourne, Australia: Climate change adaptation refresh 2017 (City of Melbourne, 2017)	Impacts of climate change are felt in the city of Melbourne: drought, floods, and extreme heat events are the most important ones. Such events are becoming more intense and will happen more often. The document elaborates on the major climate events that happened. This makes it more recognizable. For example: they name a specific street in the city and explain what climate event happened there. Five goals are stated in this document, which also entails a vision. The goals are stated under the topic of content of transition. Besides, these goals contain an explanation of the status, and the desired status of climate adaptation and a couple of action-targets are mentioned. A few goals are directly linked towards clime-proof (goal 1 and 2), so these goals will be	The climate change adaptation strategy of the city of Melbourne, which they published in 2009, was the first of its kind in Australia. Since 2009, a lot has happened: many climate adaptation projects have been done and all the work is embedded in the they work in Melbourne. Since new scientific information has occurred and new policy developments happened, the strategy of 2009 is evaluated to determine where the city should focus on next. When using the climate change adaptation process, the city of Melbourne is now in phase 4: monitoring (phase 1: research and assessment, phase 2: planning and action development, phase 3: Implementation, phase 4: monitoring).	The purpose of this document is to consider the developments of the past few years (new scientific information and new policy developments) and details how the city will increase their efforts and implement new work towards the vision of a city that is adapting well to the changing climate. Within the document it is argued that the city must work more often and effectively with partners to ensure that Melbourne's citizens are protected and that benefits for social-, economic- and environmental sectors are achieved. Since the city of Melbourne cannot do this on its own, partnerships on different levels must be improved. These levels are the local, the Victorian (as a province for the city) and the

	elaborated so that the climate-proof content can be detected. Goal 1: reduced rainfall, heatwaves and drought will attack parks, gardens and streets and these effects are already observable in the city. By retaining water in the urban area, expanding the number of green spaces, installing temporary shadow spaces will help to cool down the city. By implementing these small-scale projects, the city will also improve its prevention against floods. Moreover, through multiple strategies such as Growing Green Guide and Urban Forest, the city is aiming to cool the city down and this will also increase the biodiversity of the city. Goal 2: impacts of climate change can disrupt the built environment. By incorporating opportunities in new suburbs, the built environment of the city can become more resilient against the effect of climate change. Think about water sensitive urban design or investments in better infrastructure and renewable projects.	To be able to reach an effective way of working with climate change adaptation, five goals are stated: 1. Enhance the natural environment and green spaces of our municipality. 2. Shape our built form and urban renewal areas to withstand future climate change impacts. 3. Strengthen the resilience of our inclusive, family friendly and culturally diverse community. 4. Protect and enhance our diverse economy. 5. Continue to build Melbourne's adaptation capabilities and expertise. This should all lead towards the main objective, which is that Melbourne thrives and prosper and continue to be a global leader in climate change adaptation.	Australian government. Within these levels, partnerships with agencies and organization should be achieved. Moreover, within the document a few stakeholders are specifically mentioned. The Melbourne Water and the water retailers, to be able to achieve the level of flood mitigation/ management that will protect the communities and enable safety and enables growth in low-lying areas. Also, Victorian government agencies are mentioned, to make sure that planning and development in urban renewable areas consider floods, flood management, heat refuges, etc. In this way an overall basis will be created for the whole Australian province. The city is also aiming to encourage greening the private realm. So, therefore, the citizens and their own land is also of interest.
Province of Flanders, Belgium – Vlaamse klimaatstrategie 2050 (Vlaamse Overheid, 2019)	In the document, the consequences of climate change for the whole of Belgium are stated. The consequences are: - Raising temperatures. From the 19e century until now, this increase is almost 2,5 degrees - Each year, there will be a heatwave. In the past, there was only one heatwave per three years. - The water-availability will decline due to the increase of evaporation. - Sea-level will continue to rise. Overall, this will result in increasing temperatures, increase of heat-wave days, increase of wet days,	The way, and therefore also the strategy, towards the future must be flexible since the future is not totally predictable. However, choices must be made to do something. By evaluating and monitoring the way towards the future, you can adjust the way if that is necessary. The document is therefore not really an end-document: it is the starting point for a long-term process towards 2050. The document goes a lot about climate mitigation, focusing on greenhouse gas emissions and how to reduce it. Despite this focus, also climate	By producing this document, the province of Flanders aims to combine forces to strive together towards the end-goal of being climate-proof in 2050. Each of the features mentioned below the content of climate-proof is explained broadly in the document. This entails information on how to proceed the features. Since this document contains a strategy for acting of the government of Flanders, no other stakeholders are mentioned. However, within the features, also objectives on raising awareness are mentioned and this indicates that there eventually are some

	increase of drought, and increase of extreme and more precipitation. By performing the goals of the document, mentioned under the content of the transition, the province of Flanders will become climate-proof in 2050. A couple of clear stated, and climate-proof, examples are given. By achieving the goals: - The water-infiltration and retention capacity will increase, which will result in being a climate-buffer when the open and unpaved areas will be expanded. - By focusing on the increase of the green-blue infrastructure, a green and healthy living environment will be produced when such spaces will be designed in a climate adaptive way. - When areas are protected against floods, damage is prevented and coming floods will be predicted and warned, this will minimalize the risk on water nuisance. - When the green-blue infrastructure is not only increased or maintained in already open areas, but also in dynamic and built-up areas, this will really increase the green blue infra in the province. - By adding adaptive elements and increasing the awareness, industrial areas will become more adaptive, and companies will know what to do to make their buildings more climate adaptive. - By efficiently designing the open area, crops and verities can be adjusted when necessary and by decrease the paved surface, the resilience of agriculture land will increase.	adaptation is featured and due to the purpose of this study, the focus will be on adaptation. Because of the previous mentioned consequences of climate change for Belgium, action of climate adaptation is necessary. Within the document, some main features are mentioned: 1. Indemnify and expansion of open and unpaved areas 2. Climate adaptive spaces, society, buildings, and infrastructure 3. Minimalizing of risks on water scarcity and nuisance 4. Maximalization of green-blue infrastructure 5. Climate adaptive industrial areas 6. Climate adaptive design of agriculture areas	collaborations with other stakeholders than the government. Despite there is no clear assigning of a role or responsibility in the field of climate adaptation to other stakeholders than the government, the document does mention that effort is needed from citizens, companies, and governments to let the climate mitigation process be a success.

Province of Gelderland, the Netherlands: Actieplan klimaatadaptatie – Samen op weg naar een klimaatbestendig Gelderland (Provincie Gelderland, 2021)	Currently, the province must deal with heat, floods, and drought. Climate-proof means that there is no water shortage, no heat-stress, and no flooding in 2050. In addition, - by building 'climate smart' through increasing the amount of green space and heat-resistant buildings, - through tackling the problem of drought in de Achterhoek, - to consider the changing climate in sectors such as the agriculture, nature, recreation, and mobility, - and finally, to do something about heat stress in the villages and cities of the province, the climate-proof status is reached by achieving these features. Moreover, by 2050, the province of Gelderland is prepared to have periods of heat and drought, but also periods of extreme precipitation. When Gelderland is thinking and working based on this preparedness, the province is climate-proof. Different themes are explained in the document which together contain the step towards the future. They are explained by the content of transition. These themes are currently the most important themes where action is needed now. For each theme, very concrete and practical actions and measures are mentioned.	Within the document, the way towards a climate-proof Gelderland is described based on five themes. 1.Natural soil and water system as a basis. The areas should be redesigned in a way which is a contribution towards the characteristics of the soil- and water system. To reach this status, three steps should be taken: creating knowledge, implement the knowledge and inspire the province. Each of the steps is very specific elaborated with concrete measures and actions. 2. Green cities and villages. An important way to prevent the province against the changing climate is to green the cities and villages. Because of this, Gelderland is doing five things: challenge projects, planting trees in neighborhoods, greening subsidies, research to climate-proof green in the city and knowledge sharing for greening industrial areas. 3) Climate-proof (re)building. When building new houses or industrial buildings, too little attention is paid towards climate-proving it. Because of that, the province will stimulate the choice of location and the design of an area towards a more climate-proof version with different projects. (4) Climate-proof provincial roads. Because of the increasing of floods and drought, the infrastructure in Gelderland is damaged. That is why natural- and technical solutions are implemented around infra. The goal is to have climate-proof infrastructure within nine years, and this is elaborated within a guideline-explanation. (5) Heat stress. The increasing temperatures have influence on health- and spatial factors, namely: on an area, on buildings and on residents. Currently,	The document should clarify which climate adaptive steps will be taken in the province of Gelderland in the coming period of the current coalition. Overall, the province is aiming to be climate-proof in 2050 and this document should contribute to it. The way towards a climate-proof Gelderland in 2050 is not a transition only of the province. The province is working together with municipalities, water authorities, residents, social housing corporations and other stakeholders. This cooperation is based on the 'Deltaplan Ruimtelijke Adaptatie'. Within these plans and actions, the municipalities and the water authorities are in the lead. The province supports them when needed and they also so support in knowledge and advice.

		they work on a cooperated heat-action which includes raising awareness, linking different tasks, research, financial discovery, supporting measures.	
Republic of South Africa – National climate change adaptation strategy: Version UE10 (Republic of South Africa, 2019)	To know how South Africa sees its climate-proof status, it should become clear which climate change effects they notice. South Africa experiences the effects of climate change, particularly because of increased temperatures and rainfall. Moreover: - Rate of warming has been 2 degrees - Extreme weather events are increasing - Heat wave conditions will occur more often - The drought duration lengthening will increase - Increasement of more and intense rainfall - Climate zones in South-Africa are shifting, which means that ecosystems and landscapes are being degraded - Fires are becoming more frequent. For all these consequences, climate change adaptation is necessary. Moreover, it is also an opportunity to transform both the health and the economy. In the document, the estimated future water supply vulnerability, the settlements at risk of floods, the projected impact of climate change for heat stress and the settlement for drought increase risk are visualized via clear maps. Via such maps, you see and know exactly which area is vulnerable for which climate risks. There are four objectives stated in the document which are a contribution towards the content of climate-proof:	The strategy of climate adaptation for South Africa is based on multiple policy documents, among which: the national climate change response policy, the national development plan, the national strategy for sustainable development, the adaptation commitments included in its nationally determined contributions, sector adaptation plans, provincial adaptation plans and municipality adaptation plans. In addition, the NCCAS builds upon principles of legislation and policy in South Africa, including the National Environmental Act and the constitution, that speaks to the rights to a safe and healthy environment. The NCCAS is a ten-year plan that will be reviewed every five years. Since the development of the NCCRP, considerable progress has been made in developing adaptation policies, plans and strategies in various sectors and spheres of government, including the development of climate adaptation plans in local and provincial government. The main objective of the document is stated via the vision: to transition to a climate resilient South Africa, which will follow a sustainable development path, guided by anticipation, adaptation and recovery from a changing climate	The NCCAS provides a common vision of climate change adaptation and climate resilience for South Africa, and outlines priority areas for achieving this vision. The NCCAS is divided into sets of strategic objectives, strategic interventions, and strategic outcomes with associated actions. The document is directed not only at national government departments, but also to the South African society, including key sectoral institutional, provincial governments and municipalities, and non-government entities. Within the document, information is provided on different topics: - Reduce vulnerability and build adaptive capacity - Climate services - Climate risk and vulnerability assessment framework - Adaptation planning and mainstreaming - Research - Awareness and capacity building - Governance and legislation - Finance - Monitoring and evaluation Each topic is supported by an introduction, the status quo and the actions taken on its topic (all related to climate change adaptation). Again, each topic is supported by broad elaborated tables which clearly visualizes the topic.

	1. Build climate resilience and adaptive capacity to respond to climate change risk and vulnerabilities 2. Promote the integration of climate change adaptation response into development objectives, policy, planning and implementation. 3. Improve understanding of climate change impacts and capacity to respond to these impacts 4. Ensure resources and systems are in place to enable implementation of climate change responses. Each of these objectives are supported by strategic interventions and strategic outcomes.	and environment to achieve our development aspirations.	
Indonesia – Indonesia Climate Change Sectoral Roadmap; synthesis report (ICCSR, 2009)	Due to its geographical location, Indonesia's vulnerability to climate change cannot be underplayed. The country will face, and is already experiencing the issues, such as prolonged droughts, flooding, rising sea-level, and increased frequency of extreme weather events. Because of this, the biodiversity of Indonesia is at risk. Measures are needed to protect the people from Indonesia. Within the document, a very specific clarification of the climate change hazards in the country are elaborated, such as the increase of the surface air temperature and the increasing precipitation patterns. To cope with climate change, the roadmap sets up three categories of activities in each development sector. The categories are: 1. Data, information, and knowledge management	In 2007, the Indonesian government published the National Action Plan on climate change. To elaborated further on this document and speed up the implementation, the roadmap for mainstreaming climate change issues into national development planning was developed. The roadmap is developed to cover a time frame of 20 years (until 2029). Priority programs are outlined in four phases of five years each. To anticipate the climate change challenges, the roadmap set several goals with regards to adaptation and mitigation of climate change to be achieved in the next 20 years. The goals are: 7. Advanced research on the impact of climate change and the mapping of local vulnerability, and inventory of CO2 emissions. 8. The strengthened of the institutional capacity of national ministries and agencies to anticipate climate change impacts, and the	The aim of the document is to mainstream climate change into the national medium-term development plan. It outlines the strategic vision that places particular emphasis on the challenges emerging in different sectors. The document provides the long-term commitment to emission reduction and adaptation measures, and it shows the ongoing, innovative, and future climate adaptation programs. It is expected from this document that national programs will consider the future climate-change. The sectors that need to plan adaptation actions are water resources sector, marine and fisheries sector, agriculture sector, and health sector.

	2. Planning and policy, regulation, and institutional development 3. Plans and programs Implementation and Control with Monitoring and Evaluation. In addition, in the roadmap is a summary for each sector. Within the summary, climate hazards are elaborated and specific activities as solution are mentioned and elaborated in tables and figures	decrease of emission of greenhouse gasses by 26% in 2020. 9. The optimalization of national development goals with the influence of adaptation actions, and to have an alternative source of energy use. 10. Reduction of the risk from climate change impacts on all sectors of developments, through public awareness, strengthened capacity, improvement of knowledge, and the application of technology. Each of the goals do include a specific time lap and end-date.	

Appendix D = Elaboration on the novelties obtained from the interviews

As explained in the main text of this research, in this appendix an elaboration of the novelties obtained from the interviews is provided. As such, each novelty of Table 6 in the main text is explained broadly and, in a way, this appendix provides the foundation for the smaller explanations in Table 6. In this elaboration, it should be considered that all information is obtained from the interviews. If other resources were used, this is mentioned.

Kenschets: Opmaat naar Klimaatrobuuste beeklandschapppen – Noordoost Brabant op maat → Obtained from the interviews 1, 11, 13 and 15

The pilot-project in the North-east of Brabant is part of a separated project group, including multiple municipalities, two water authorities and interest groups. The project group is called: Stream landscapes Northeast Brabant. This novelty is commissioned by this project group and developed and produced by Wageningen University & Research. Since the pilot-project of The Guide is part of this project group, this novelty is argued to be related to The Guide. Within this document, the challenge is explained, the different streams are described and a glimpse towards the future is given. Based on this document, the project group developed a kind of guideline in which scenarios are stated to clarify what happens when you act in a specific way. This guideline is developed during the time of this research and will be send towards the boards of municipalities in the Northeast of Brabant, in order to inform them and make them aware of the challenges that take place.

Design opportunities in the landscape → Obtained from the interviews 1 and 11

The project-group in the Northeast of Brabant developed a second novelty. Again, the pilot-project of The Guide is part of this project-group. The stakeholders in this project-group are investigating design opportunities in a sort of area-studio. This could be described as a kind of workshop were through collaboration the opportunities are investigated. This novelty should result in identifying specific spots in the landscape where the design opportunities could be implemented. These possibilities have to do with intercepts to adapt to the changing climate. For instance, these spots aim to retain water and therefore, prevent flood-problems downstream.

Aa of Weerijs in the surround of Zundert → Obtained from the interviews 2, 5, 9 and 12

In the West of Brabant, there is a pilot-project as well. This project is focusing on the stream landscape of the Aa of Weerijs, in the surround of Zundert. In this pilot-project, a new approach is used. Within this project, specific methods are used to clarify the climate robust possibilities within the area. This approach is incorporated in collaboration with different stakeholders: not only government-organizations, non-government organizations as well. This latter stakeholder group have a big share of influence in this project, and therefore it can be seen as a bottom-up approach of the challenge. This novelty results in actions which produced in collaboration with the local citizens and therefore, it is widely supported. Accordingly, this pilot-project is based on its collaboration between multiple stakeholders.

Vision Tongelreep → Obtained from the interviews 3, 4, 6 and 10

Subsequently, the pilot-project in central Brabant resulted in a novelty too. Accordingly, it is argued to relate to The Guide. Compared to above pilot-projects, it differs. Within this pilot, a

collaboration between involved governments is set up: municipalities, the water authority, the province located within the stream landscape of the Tongelreep are part of it, as well as some Belgium governments which are part of the stream too. These governments held multiple conversations and discussions with the aim to learn from each other and to clarify the definition of climate-resilience for the Tongelreep is, what bottlenecks and interests are, and what possible next steps could be to become climate-resilience. These conversations resulted in a vision specifically for the stream landscape of the Tongelreep. During this research, the vision is presented to the directors of the involved governments. Eventually, these directors should decide to act.

Bouwstenen → Obtained from the interviews 7 and 9

The province itself is taken steps after The Guide as well. During the interviews it becomes clear that the pilot-projects differ from each other; the province has currently another kind of involvement in each of the projects. Besides, it is already a couple of years ago that The Guide was published. In the meantime, the province did experience a few things from the pilot-projects. Currently, the province is developing 'bouwstenen', which can be directly translated towards building blocks, in which these experiences are translated. Within this novelty, different concepts of a stream landscape are explained and elaborated. For instance, it is experienced that water should infiltrate more on the flanks of the stream landscape. The 'bouwsteen' is then clarifying how you can develop this infiltration. Another 'bouwsteen' could be the important lessons learnt in collaborating with other stakeholders. As a result, bouwstenen could be based on implementation or more process-related action.

The Guide 2.0 → Obtained from the interviews 1 and 2

Although in the main text of this report it was argued that no successor of The Guide is developed, there still is a document called The Guide 2.0. This document is a note which was produced a year after the publishing of The Guide. Within this note, new obtained information of the pilot-projects is stated. It clarifies the definition of climate-resilience, water-robustness, and climate-robustness as well as the kind of measures could be taken to do something about floods or droughts. As such, one could argue that there is indeed a successor of The Guide. However, this note was never published in public and stayed on a quite internal basis. It was mostly about what the province could do, instead of involving other important stakeholders. Therefore, in general this novelty is not identified as a successor of The Guide. It can be more seen as a kind of evaluation.

Gebiedsgerichte aanpak groenblauw (GGA) → Obtained from interview 5

Gebiedsgerichte aanpak can be directly translated as an area-oriented approach. This is a novelty which is not specifically related towards The Guide. This is an approach which is based on the perspective that if a natural area should be improved, the view should not be solely on the area itself. Instead, the view should be broadened towards the incorporating the surrounding areas as well. Such an integral view is necessary as the areas do influence each other. This approach is originally derived from the KRW, which is a framework to improve the hydrologic quality of natural area by 2027. Within the area-oriented approach, multiple stakeholders are part of it as well. This is an approach which is incorporated in the novelty of the pilot-project in the West of Brabant as well. Although in this approach the perspective of the stream landscapes involved, it is not the main objective of the approach: this is much broader and focuses on only natural conservation too. However, since it is in agreement with the layers-

approach of the province as well, as it will become part of the future approach of the province, it is argued to be an interesting novelty to consider.

Klimaatonderlegger → Obtained from the interview 13

The Klimaatonderlegger came to focus during the data collection at a municipality. A klimaatonderlegger can be directly translated as a climate map. This map is built from layers, incorporating different parts and qualities of the landscape. As it should become an accessible map, it will make the notion of climate tangible. You can use this novelty during administrative decision-making processes. For instance, when new housing or industrial areas are developed, this map clarifies which landscape qualities should be considered. This enables the possibility to consider for example the process of redeveloping the stream landscapes in a more climate-proof version. Through this map, the landscape becomes part of the administrative decision-making process. Thus, landscape qualities are included in spatial planning. This novelty is not directly related to The Guide, as it was already published before The Guide was published. However, the perspective of The Guide is incorporated in this map and therefore, the Klimaatonderlegger contributes to the goal to be climate-proof by 2050 as well. The figure below visualizes a part of the map. When considering landscape qualities when studying the figure, it becomes clear that indeed provides a map where the important aspect of the landscape is layed down over the whole region. Despite, no legenda could be found and therefore, this is not incorporated in the figure.

Figure: part of the Klimaatonderlegger. Obtained from: https://dewaardenmakers.nl/portfolio/klimaatonderlegger/

Delta Program of High-Sandy Soils → Obtained from the interviews 8 and 16

The Delta program of the high sandy soils is a novelty too. It is a national program which focusses on the water quality and scarcity, mostly on fresh water. This national program is translated into a regional version, specifically for the province of Noord-Brabant. In this regional plan, technical measures are stated. These measures can be used to solve challenges on these high-sandy soils. Part of this plan are also subsidy schemes. Thus, stakeholders who wants to implement these measures can be financially supported. This support creates a practical basis of the document. The interviews argues that this document can be partly seen as a next step of The Guide, since stream landscapes are part of these high-sandy soils (the whole province consists of it). Despite, it is a national program and therefore, it cannot be assigned directly towards The Guide. However, it is close connected.

Design-thinking → Obtained from interview 8

The novelty of design-thinking also came to focus on the dataset of the interviews. This is new way to approach wicked problems. One could argue that the stream landscape challenge in view of climate change is a wicked problem. As this is a new approach, it is argued to be a novelty. Although it is not originated from the stream landscape challenge, it is interesting to consider in the future. The interview made clear that design-thinking is about approaching wicked problems by first breaking it open to discover all interests involved. As a government, you start talking to stakeholders and observing. This is something different than governments are used to. The governments should not have an opinion in advance and therefore, they are not able to influence others or themselves. This observation and conversation have a big share in the whole process of design-thinking. After this, solution paths are investigated. These solutions are based on the input of others. They are tested and refined. Because of this, possible uncertainties are reduced, since involved stakeholders were part of this whole process: they are aware of the possible solution. After a while, it becomes clear what works and what does not. In a way, this provides a new approach which can be used in the transition towards 2050.

KLIMAP → Obtained from interview 17

KLIMAP is an abbreviation of 'Klimaatadaptatie in de Praktijk', which can be directly translated towards Climate Adaptation in Practice. After obtaining the knowledge on this project, it is argued to be an equal development in view of this study. Therefore, it is an interesting novelty to consider. KLIMAP is a project which is currently conducted. It aims to develop a methodology where adaptation pathways on a decentral level are the focus. This methodology is developed through multiple cases. Within the cases, a specific concept is incorporated. In turn, it is evaluated how it works in a case. This clarifies what works and what does not. These experiences will be adjusted to the methodology. Afterwards, the project focusses on other cases and uses the same methodology and steps including the adjustments. This is an iterative approach. An important notion within the methodology is that measures are put in time. In this way, different strategies to get to an objective are clarified. During the data collection, reference was made to the figure below, which clarifies the principle. The figure explains that if you want to go to the future, there are various actions one could take. Each of them has their own procedure and they can also take place next to each other. This novelty clarifies that current practices can possibly have an end-date. In the interview, the following example is given. Currently farmers often use groundwater to irrigate their land. However, using this methodology, it becomes clear that this is a measure which cannot be taken forever, since the groundwater level declines. Therefore, other measures should already be prepared when the groundwater as irrigate-measure is not appropriate anymore. This explains that measures are put in time.

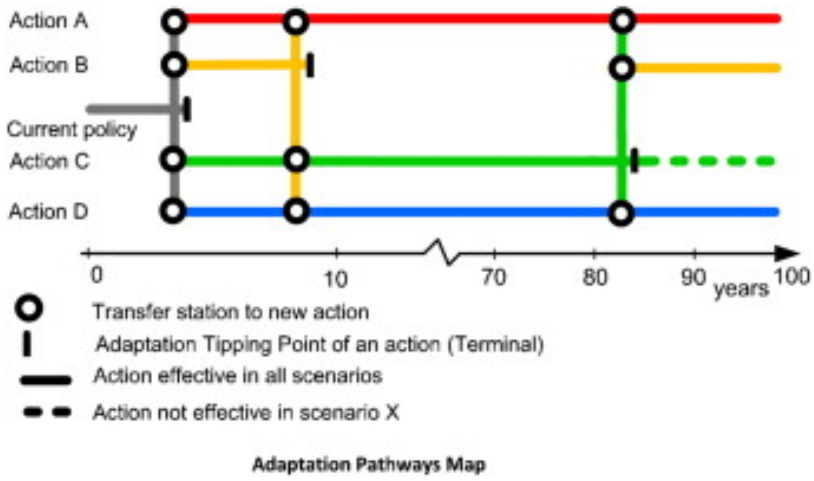


Figure which clarifies the methodology that the project of KLIMAP aims to develop. This figure is obtained from: Haasnoot, M., Kwakkel, J. H., Walker, W. E., & Ter Maat, J. (2013). Dynamic adaptive policy pathways: A method for crafting robust decisions for a deeply uncertain world. *Global environmental change*, *23*(2), 485-498.

Appendix E = Interview protocol for employees of the province of Noord-Brabant

This interview protocol is in Dutch, since Dutch is the shared language between the interviewees and the interviewer.
*The introduction and closure of each interview protocol will be the same as stated in this interview protocol. Therefore, the introduction and closure will only be stated in this interview protocol.

Introductie*:

Voorstellen	Naam, opleiding, begeleider, etc.
Doel onderzoek	In hoeverre dragen adaptieve reisgidsen als beleidsinstrument van regionale overheden bij aan regionale adaptatie doelstellingen?
Doel interview	Inzicht krijgen in hoe de provincie denkt/ kijkt/ gebruik maakt van reisgidsen en met wie ze hiervoor samen moeten/ willen werken.
Duur interview	Ongeveer 45 minuten
Verwerking informatie	Informatie afkomstig uit interview zal gebruikt worden voor onderzoek, analyseren.
Vragen opname	Vanwege deze verwerking zou ik graag een opname willen maken van ons gesprek, om zo een transcript te kunnen uitwerken waardoor ik de analyse kan doen. Is dit goed?
Anoniemiteit	In het transcsript en in mijn eindproduct bent u anoniem. Er zal alleen naar uw organisatie worden verwezen.
Vragen vooraf?	Voordat we beginnen, heeft u nog vragen voor mij?

Vragen:

<u>Openingsvraag</u>

1) Hoe bent u betrokken bij de reisgids: op weg naar klimaat robuuste beeklandschappen? (Totstandkoming? Vervolg? Realisatie?)

<u>Sub 1: Wat voor soort klimaatdata en procedurele kennis bevatten adaptieve reisgidsen?</u>

2) Welke problemen pakt de gids aan?
3) Wat is het doel van de gids?
4) Welke stappen neemt de gids om dit doel te bereiken?
5) Hoe ziet het einddoel of het toekomstbeeld eruit?
6) Welke informatie zit er in de gids?
7) Wat zou er in het huidige beleid moeten veranderen?
8) Wat zou er in de huidige gewoontes van de samenleving moeten veranderen?

<u>Sub 2: Wat zijn algemene karakters in het proces en de ontwikkeling van adaptieve reisgidsen?</u>

9) Door wie is de gids gemaakt?
10) Voor wie is de gids gemaakt?
11) Wie is er binnen de provincie allemaal betrokken bij de gids? Qua projecten of afdelingen?
12) Met welk doel worden de stakeholders betrokken?
13) Wie neemt de leiding in het gebruik van de gids?

<u>Sub 3: Hoe nuttig of bruikbaar is de reisgids: klimaat robuuste beeklandschappen voor lokale belanghebbende?</u>

14) Wat wordt verwacht van lokale stakeholders binnen de gids?
15) Hoe wordt de gids verspreid?
16) Hoe worden lokale stakeholders betrokken?

<u>Sub 4: Hoe waardeert de provincie Noord-Brabant het gebruik van de adaptieve reisgids?</u>

17) Wat is er sinds de publicatie van de gids gebeurd binnen de provincie?
18) Zijn er plus- of minpunten aan het huidige gebruik van de provincie met de gids?
19) Wat zouden mogelijke vervolgstappen kunnen zijn van de provincie in het gebruik van de gids?
20) Geeft de provincie zelf het goede voorbeeld wat betreft het klimaat robuust maken van beeklandschappen?
21) Zijn er andere voorbeelden van reisgidsen binnen de provincie die ook een verandering naar de toekomst moeten bewerkstelligen?

Afsluitende vragen

22) Tot slot, hoe ziet u de klimaatbestendige toekomst van de Brabantse beeklandschappen tegemoet?

Afsluiting*:

Vragen onderwerp	Heeft u verder nog iets te zeggen over het onderwerp?
Vragen voor mij	Heeft u vragen voor mij?
Bedanken	Heel erg bedankt voor de antwoorden en de vrijgemaakte tijd.
Controle transcript	Voordat ik ga beginnen met analyseren, wilt u het transcript van dit gesprek controleren?
Versie eindproduct	Wanneer ik dit onderzoek afrond, zou u een versie van het eindrapport willen ontvangen?

Appendix F = Interview protocol for employees of the water authorities

This interview protocol is in Dutch, since Dutch is the shared language between the interviewees and the interviewer. Moreover, the introduction and closure of the interview protocol is the same as in the interview protocol of employees of the province. Therefore, this part is not shown in this interview protocol.

Vragen:

Openingsvragen:

23) Bent dus betrokken bij/ kent u een project van het waterschap over een herinrichting van een beeklandschap?
24) Wat kunt u daar over vertellen qua doel? Wat houdt het project in?
25) In welke mate heeft klimaatbestendigheid een rol binnen deze projecten
26) Heeft de reisgids: op weg naar klimaat robuuste beeklandschappen? Ook een rol in het project?

Sub 1: Wat voor soort klimaatdata en procedurele kennis bevatten adaptieve reisgidsen?

27) Welke klimaatproblemen komen voor binnen het project rond de herinrichting van het beeklandschap?
28) Welke stappen neemt het project rond het beeklandschap voor deze problemen?
29) Hoe ziet het einddoel/ toekomst beeld eruit van het project rond het beeklandschap?
30) Wat zou er kunnen/ moeten veranderen om de herinrichting van het beeklandschap te realiseren?
    a. In beleid?
    b. In gewoontes van de samenleving?
31) Wat is er sinds de publicatie van de reisgids gebeurd binnen het project van de het beeklandschap?

Sub 2: Wat zijn algemene karakters in het proces en de ontwikkeling van adaptieve reisgidsen? + Sub 3: Hoe nuttig of bruikbaar is de reisgids voor lokale belanghebbende?

32) Wie nam het initiatief in het project rond het beeklandschap?
33) Wie neemt nu de leiding?
34) Welke stakeholders zijn betrokken bij het project rond het beeklandschap?
35) Met welk doel worden de stakeholders betrokken? Wat wordt er verwacht van lokale stakeholders rond het beeklandschap?
36) Hoe vullen de lokale stakeholders hun rol in?
37) Welke rol heeft het Waterschap binnen de reisgids?

Sub 4: Hoe waardeert de provincie Noord-Brabant het gebruik van de adaptieve reisgids?

38) Hoe kijkt u naar het gebruik van lange termijn visies in het algemeen?
39) Dragen zulke beleidsdocumenten bij aan echte realisatie?
40) Hoe zorg je er voor dat zulke beleidsdocumenten niet blijven zweven?
41) Binnen de visie van klimaat robuuste beeklandschappen; hoe kijkt u naar de rol of stappen die de provincie zou moeten nemen?

Afsluitende vragen

1) Tot slot, hoe ziet u de klimaatbestendige toekomst van de Brabantse beeklandschappen tegemoet?

Appendix G = Interview protocol for local involved stakeholders

This interview protocol is in Dutch, since Dutch is the shared language between interviewees and the interviewer. Moreover, the introduction and closure of the interview protocol is the same as in the interview protocol of employees of the province. Therefore, this part is not shown in this interview protocol.

Vragen

Openingsvraag:

1) Wat voor invloed heeft het beeklandschap van Brabant op de gemeente?
2) Kent u de reisgids: op weg naar klimaat robuuste beeklandschappen?
    a. Ja? Hoe bent u hierbij betrokken? (Ontwikkeling? Vervolg?)
    b. Nee? Uitleggen

Sub 1: Wat voor soort klimaatdata en procedurele kennis bevatten adaptieve reisgidsen?

3) Welke problemen pakt de gids aan voor de gemeente?
4) Welke invloed heeft de provincie op dit probleem?
5) Wat is het doel voor de gemeente omtrent klimaatrobuuste beeklandschappen? Waar streeft het naar?
6) Welke stappen neemt de gemeente om dit doel te bereiken?
7) Is er verandering nodig in beleid of samenleving om deze stappen te kunnen zetten?
    a. Wat zou er in het huidige beleid moeten veranderen?
    b. Wat zou er in de huidige gewoontes van de samenleving moeten veranderen?
8) Zijn de stappen haalbaar?
9) Welke rol heeft de gids in deze stappen?
10) Heeft de gemeente zelf een strategie of plan die aansluit op dit document van de provincie?

Sub 2: Wat zijn algemene karakters in het proces en de ontwikkeling van adaptieve reisgidsen? + Sub 3: Hoe nuttig of bruikbaar is de reisgids: klimaat robuuste beeklandschappen voor lokale belanghebbende?

11) Wat betekent het concreet voor de gemeente dat de provincie zo een soort document heeft gemaakt?
12) Hoe bent u bekend geraakt met de gids?
13) Welke rol en verantwoordelijkheid heeft de gemeente in het klimaatrobuust maken van de beeklandschappen?
14) Hoe staat het werken ervoor wat betreft deze rol?
15) Wat zou volgens de gemeente de rol van de provincie moeten zijn?
16) Wat heeft gemeente gedaan naar aanleiding van deze gids of dit doel?
17) Hoe bruikbaar is zo een soort document van de provincie voor de gemeente? In het algemeen?
18) Welke handvaten biedt zo een soort document aan? Of juist niet?

Sub 4: Hoe waardeert de provincie Noord-Brabant het gebruik van de adaptieve reisgids/ lange termijn doelen?

19) Wat zouden mogelijke vervolgstappen kunnen zijn voor de provincie in het gebruik van de gids?
20) Welke waarde hangt u zelf aan lange termijn doelen en stappenplannen daarnaartoe?

Afsluitende vragen

21) Tot slot, hoe ziet u de klimaatbestendige toekomst van de Brabantse beeklandschappen tegemoet?

Appendix H = Interview protocol for the experts

This interview protocol is in Dutch, since Dutch is the shared language between interviewees and the interviewer. Moreover, the introduction and closure of the interview protocol is the same as in the interview protocol of employees of the province. Therefore, this part is not shown in this interview protocol.

Openingsvragen:

1) Wat kunt u vertellen over de link tussen uw werk en klimaatbestendigheid in de Brabantse beekdalen?

Sub 1: Wat voor soort klimaatdata en procedurele kennis bevatten adaptieve reisgidsen?

2) De casus in mijn onderzoek, de reisgids: op weg naar klimaatrobuuste beeklandschappen, is een voorbeeld van een adaptieve visie of inspiratiedocument van de provincie. Komt u in uw werkveld dit soort documenten vaker tegen?
3) Wat zijn daarin specifieke elementen die u daarin herkent?
    a. Klimaatdata?
    b. Procedurele kennis?
4) Het doel van mijn casus is om klimaatbestendige beeklandschappen te creëren, wat uiteindelijk moet bijdragen aan het zijn van klimaatbestendigheid in 2050. Hoe kijkt u naar het gebruik van dit soort lange termijn doelen? Hebben ze nut?
5) Hoe kijkt u naar korte termijn doelen op het gebied van klimaatadaptatie?
6) Wat is de nut of noodzaak van dit soort korte termijn doelen ten opzichte van lange termijn doelstellingen?
7) Hoe zien beide doelen eruit?
8) Welke stappen kan een overheid nemen om dit soort doelen (lange en korten) te behalen? Of de weg ernaar toe te starten?
9) Is er verandering nodig in beleid of samenleving om deze stappen te kunnen zetten?
    a. Wat zou er in het huidige beleid moeten veranderen?
    b. Wat zou er in de huidige gewoontes van de samenleving moeten veranderen?
10) Zijn dit soort stappen haalbaar gelet op de huidige situatie van hoe dingen nu gaan?
11) Zijn er bepaalde zaken die ervoor zorgen dat het veranderen van de omgeving bemoeilijkt (Lock-in/ pad afhankelijkheid)?
12) Veelal zijn dit soort documenten abstract. Hoe maak je de punten erin praktisch? Hoe denkt u daarover?

Sub 2: Wat zijn algemene karakters in het proces en de ontwikkeling van adaptieve reisgidsen? + Sub 3: Hoe nuttig of bruikbaar is de reisgids: klimaat robuuste beeklandschappen voor lokale belanghebbende?

13) Voor wie zijn adaptieve visies in het algemeen eigenlijk bedoelt?
14) Met welk doel worden deze visies verspreid onder betrokkenen?
15) In welke mate is een leider in dit verhaal van belang?
16) In welke mate is samenwerking van belang?
17) Hoe kijkt u naar de rol van lokale stakeholders in heel deze opgave?
18) Hoe kijkt u naar de rol van de verschillende overheden in heel deze opgave?

Afsluitende vragen

19) Tot slot, als u kijkt vanuit uw functie en gedachten: hoe ziet u de klimaatbestendige toekomst van de provincie tegemoet?