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Building Urban Resilience by Integrating Co-Benefits of Climate Adaptation into Urban Planing Processes

A case study of Vejle

Master Thesis

Submitted by
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Abstract:

Scientific records of climate evolution show new patterns of climate extremes that make effective adaptation and resilience-building more urgent than ever. The complexity of urban systems call for adaptation measures that take cross-sectoral considerations into account. The study examines the conceptualisation of adaptation co-benefits, their significance and *how they can contribute to urban resilience in the local context of Vejle*. In this context, the focus lies on Vejle's Storm Surge Strategy (Stormflodsstrategi) as one of the priority actions in its Resilience Strategy. It may be concluded that there is a strong focus on adaptation measures that incorporate environmental, social and economic co-benefit approaches. The advantageous initial status of experiences in cross-sectoral projects and financial support facilitated the pursuit of co-benefit considerations in the form of nature-based solutions that may entail potentials such as flexibility, adaptivity, legitimacy and social inclusion and may, eventually, foster resilient development. However, there are still a number of challenges to overcome such as the institutional barriers and the lack of comprehensive frameworks that are related to difficulties in measuring co-benefits, disparities in cross-sectoral interests, uncertainties, and lack of experience.

A. Eggert

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Acknowledgement

First and foremost, I want to thank my supervisors Martin Lehmann who motivated me to take up the results of my third-semester project, to continue the research in a very intriguing subject and who incentivised me to consult the city of Vejle as a case. He supported me with his knowledge and expertise. Furthermore, I want to thank all the interviewees who have contributed with interest and sparing during the project, despite the exceptional circumstances around COVID-19. In that regard, a thank you goes to Jette Vindum, Lotta Tiselius, Helle Thorhauge, and Christina Olsen from Vejle Municipality for sharing their insights and perspectives. As an external researcher being involved in citizen involvement and divers planning processes in Vejle Municipality, Andreas Brandt shared with me his experiences and thoughts on his fieldwork within his Ph.D. in anthropology. Last but not least, I want to thank Ole Fryd Associate Professor for landscape architecture and planning at the University of Copenhagen who gave me valuable information and perspectives on storm surge management of coastal cities.

Preface & Disclaimer

This Master's thesis has been conducted from February 21^{st} to June 4^{th} 2020, as the final project of the Master's program *Cities & Sustainability* at Aalborg University. The motivation of this research work lies the inevitability of cities to respond to climate change impacts and the need for more holistic considerations of climate change adaptation bringing concepts of co-benefits on the stage. The study is based on Vejle as a case taking its resilience vision into account by illuminating the integration of co-benefit approaches into the strategic planning process of Vejle's Storm Surge Strategy (Stormflodsstrategi) being based on its Resilience Strategy and, thus, informed by resilience paradigm.

The research subject took its point of departure in a vibrant internship at the European Hub of the Urban Climate Change Research Network in Naples, Italy, from September to December 2019. In the course of the internship and in collaboration with the Horizon 2020 project CLARITY [2019] a joint outcome of Urban Adaptation Measure Cards represented a first conceptualisation of co-benefits of climate change adaptation measures. Initially, it was assumed that these Urban Adaptation Measure Cards could be used in workshops and focus groups in the framework of the planning process of Vejle's Storm Surge Strategy (see Appendix B). Unfortunately, this project was made impossible due to the circumstances described below.

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COVID-19 and the consequences of the lock-down of society and the university since March 13^{th}, 2020 have had an influence on which activities have been possible to stage and carry out as part of the project work. More specifically, this means that activities have been limited to online activities and that activities such as Lab activities, surveying activities, on-site ethnographic studies, and on-site involvement activities have not been possible. When assessing this project, please bear this in mind.

Student's Reflections on the Challenges

With regard to the process of my Master thesis, the primary influence of the circumstances around COVID-19 was the postponement of several events within the planning process of Vejle's Storm Surge Strategy. A public workshop organised by Vejle Municipality initially scheduled for April 16^{th} in which involvement of my work would have been possible had to be cancelled. Furthermore, the impact of COVID-19 regulations prevented me from conducting a focus group, interviews, and surveys on site in Vejle. These circumstances required me to come up with a new research design. Interviews and a web-based survey could be conducted remotely. However, the external influences regarding the slowdown and rearrangement of the Storm Surge Strategy's planning process and the study's re-design of methodologies and methods entailed obstacles, delimitations, and limitations that will be explained in the further course of this report.

Aalborg, June 4^{th}, 2020

Executive Summary

The Earth's climate has changed accelerated by human activities and accompanied by new patterns of climate extremes such as extreme heatwaves, severe rain events, and storm surges [EEA, 2016, IPCC, 2014c]. The global phenomenon of urbanisation and human pressure make cities particularly vulnerable to climate-related challenges. The intertwining of environmental, social, and economic sectors in urban systems require adaptive, mitigative, and resilient solutions that take cross-sectoral approaches into account. This study examined the capacity of climate change adaptation (CCA) co-benefits to contribute to a holistic approach promoting urban resilience. In this context, the study consults the Danish coastal city Vejle as a case where the focus lies on Vejle's Storm Surge Strategy (Stormflodsstrategi), of which a preliminary version of a report was published in February 2020. The Storm Surge Strategy is one of the priority actions in Vejle's Resilience Strategy, which was launched in 2016 in the framework of Vejle Municipality's membership of the 100 Resilient Cities (100RC) network. The overall objective of the study is to investigate: *Why do co-benefits of coastal adaptation matter and how can they contribute to the resilience of coastal communities?*. This type of research question has an inherent explanatory character that seeks explanations and understandings of practices and policy with the potential of developing good practice in regard to *How can we improve...?* [Farthing, 2016, Bryman, 2012]. In this context, the study wants to examine the practices of CCA co-benefit approaches and their conceptualisation within resilient development in a dynamic urban system.

The answering of the research question stated above is based on three analyses underlay by three sub-questions. In Sub-question I, the perceived importance for and interest in CCA is investigated. Furthermore, it addresses the analysis of local *criteria of liveability* as evaluated by the citizens of Vejle. Analysis I is solely based on a survey conducted on the internet. Sub-question II addresses the conceptualisation of co-benefits in the framework of Vejle's Storm Surge Strategy and the Resilience Strategy analyses by means of comprehensive document analyses. Sub-question III examines the integration of CCA co-benefit into the planning process of Vejle's Storm Surge Strategy. Analysis III is carried out based on the method of semi-structured interviews. The abductive research process of Analyses I, II, and III is guided by a conceptual framework. This framework represents the lenses through which the data generated by methods of document analyses, a survey, and semi-structured interviews are analysed. The conceptual framework includes consideration of co-benefits concepts, urban resilience frameworks, and institutional theory.

The analyses revealed some limitations and obstacles that arose during the research process and concerned the subsequent conclusion on the research outcome. In the context of the discussion (Chapter 10) first, methodical limitations considered questions of reliability and validity inherent in the applied methods of survey, document analysis, and semi-structured interview and second, methodological limitations pointed weak points of the research design. These weak points addressed the influence of the underlying scientific rationale (philosophy of science) and conceptual limitations. The latter pointed limitations with regard to the conceptual framework, including theoretical considerations of CCA co-benefits and urban resilience. In this context, the one major limitation of the focus on co-benefits instead of co-impacts was emphasised. Furthermore, the conceptual vagueness and ambiguity of urban resilience among scholars were

discussed and their influence on the research work was explained.

With regard to the Research Question it can be concluded that there is a high significance of CCA co-benefits that is manifested in the ambitions of 'creating something more (noget mere) than storm surge protection' [Vejle Kommune, 2020b]. In the context of Vejle's Storm Surge Strategy, co-benefits of coastal adaptation are understood as 'added value' (merværdi) that means to provide the city and its citizens with, in particular, social, and environmental co-benefits such as green and recreational spaces and an environment that benefits the health of the citizens. The Storm Surge Strategy's embedding in Vejle's Resilience Strategy introduced economic considerations in the sense of 'promoting economic growth whilst simultaneously reducing flood risk' [Vejle Kommune et al., 2016, p.31]. Beyond that, the integration of co-benefits into urban strategies may come along with several other potentials such as flexibility and adaptivity to adapt to the variability of climate risks but also to be capable 'to interrelate the concerns of the different [...] communities which co-exist in a place' [Healey, 1997, p.310]. That, in turn, increases the legitimacy, social justice and inclusion of CCA measures by means of creating 'a city for everyone'. Providing legitimacy plays an important role in the negotiating process with politicians and stakeholders and may further strengthen the accountability for CCA measures by integrating cross-sectoral co-benefits. Last but not least, it is concluded that co-benefits of CCA entail a potential of re-designing governance structures and planning processes in a way that contributes not only to the development of adaptive but also institutional capacity and, thus, to resilient development.

Concluding remarks on directions of future research (Chapter 12 pointed towards the need to critically reflect on the notion of co-benefits and to include considerations of co-impacts that include potential adverse side-effects among cross-sectoral co-impacts but also related to other objectives of urban development. This led to another obstacle of assessing co-benefits (co-impacts) associated with difficulties of setting up frameworks that address the uncertainties of co-benefit impacts and take changing dynamics and temporal and geographic scales of urban systems into account. Thus, future research must focus on methodological and theoretical ways of assessing co-benefits and must not neglect their adaptivity to local conditions. Furthermore, multi-objective frameworks need to look at local governance structures and reflect on structural forces, conflicts of interests, and path-dependencies that may impede the successful implementation process of such frameworks.

Contents

List of Acronyms

100RC 100 Resilient Cities.

CCA Climate change adaptation.

CRF City Resilience Framework.

EEA European Environment Agency.

GHG Greenhouse gas.

IPCC Intergovernmental Panel on Climate Change.

SDG Sustainable Development Goal.

SES Socio-ecological system.

STS Socio-technical system.

UAMC Urban Adaptation Measure Card.

UCCRN Urban Climate Change Research Network.

UN United Nations.

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I | Introduction

This part consists of two chapters: First, Chapter 1 introduces background information and the start of the art to the thesis topic concerning climate co-benefits (Section 1.1) and *urban resilience* (Section 1.2). Second, Chapter 2 points out the relevance and purpose of this research question. This problem analysis seeks to give rise to the problem formulation contextualised in Section 4.4, after an illumination of and argumentation for *Vejle as a case* (Section 4).

Chapter 1

Introduction

Scientific records of climate evolution show new patterns of climate extremes such as more frequent heat waves, increased intensity of rain events and storm surges that leave no doubt as to a changing climate accelerated by human activities [EEA, 2016, IPCC, 2014b, Rosenzweig et al., 2018]. According to the European Environment Agency (EEA), 'most impacts of climate change across Europe have been adverse' (apart from a few beneficial impacts such as a decrease in heating demand) [EEA, 2016, p.12]. As a consequence, the need to combat climate change employing effective adaptation, mitigation and, resilience-building becomes more urgent than ever [Ibid.]. That requires holistic approaches which address the diverse climate impacts not only on the natural environment but also on economics and human well-being [EEA, 2016, IPCC, 2014b, WHO, 2014]. Thus, adaptative, mitigative, and resilient measures need to respond to climate change by taking cross-sectoral considerations into account.

Climate mitigation can be understood as the endeavour of reducing global greenhouse gas (GHG) emissions manifested in the Paris Agreement from 2015 [UN, 2015]. This agreement on reducing global GHG emissions by 40% by 2030 and keeping the global temperature rise below 2 degree Celsius to pre-industrial levels. These mitigative endeavours can be understood as the prerequisite for (1) 'enhancing the adaptive capacity and resilience' and (2) 'reducing vulnerability, with a view to contributing to sustainable development' [UN, 2015, UNFCCC, 2015]. In this context, the Intergovernmental Panel on Climate Change (IPCC) stresses the importance of 'integrated responses that link adaptation and mitigation with other societal [and economic] objectives' [IPCC, 2014a, p.26]. That implies climate actions that go beyond sole mitigation and adaptation but also capitalise on opportunities that pave the way for climate-resilient development [IPCC, 2014b, Mitchell and Maxwell, 2010].

The concept of climate co-benefits has been analysed by various scholars and in the framework of diverse projects from which several of them take the objective of contributing to resilience as guiding paradigm [Connop et al., 2016, Raymond et al., 2017, Floater et al., 2016, Fung and Helgeson, 2017]. The motivation for research lies in the exploration of concepts driven

by a holistic consideration of environmental, social, and economic aspects of climate actions in order to provide cross-sectoral benefits. The following two sections provide an introduction into the research topic starting with *Co-Benefits of Climate Adaptation* followed by Section 1.2 that introduces briefly *Urban Resilience*.
This study will use the co-benefit approach as a point of departure for further investigation into the potential for its integration into urban planning processes in the context of resilience thinking. Eventually, not feasible but initially intended was a research design that included a case study research with on-site involvement activities in the form of workshops and focus groups (see *Preface & Disclaimer*). For the sake of feasibility, Denmark was consulted as a selection area for a possible case. Due to its climatic conditions and 7,300 km of mostly low-lying coastline, one of the major climate risks lies in the expected increasing intensity and frequency of storm surges exacerbated by rising sea level [Jebens et al., 2016]. In 2011, the EU Floods Directive got integrated into the Danish legislation leading to the designation of 10 Danish risk areas based on a preliminary flood risk assessment [Ibid.]. The city of Vejle located at Vejle Fjord along the North Sea coast was appointed as one of them and has remained designated after a reassessment in 2018. Thus, there are areas of Vejle that are at high risk of getting flooded, entailing the urgency of adapting to expected climate change impacts such as storm surges and sea-level rise (Section 4.1). This is one of the reasons why the city of Vejle was consulted as a case for this study that will focus more specifically on Vejle's Storm Surge Strategy for the development of the city's harbour area (Section 4.2. Further arguments for *Vejle as a Case* (Chapter 4) are integrated into the research design of this study. Chapter 4 will provide information on the local context of Vejle and the local significance of urban resilience and more specifically on Vejle's Storm Surge Strategy and Resilience Strategy. Eventually, it includes the formulation of the problem (research questions) the study is based on. The problem formulation (Section 4.4) will make a point of departure in the problem analysis conducted in Chapter 2, hereafter.

1.1 Climate Co-Benefits

Since the 1990s, an increasing interest in co-benefit research has been recorded. Approaches of co-benefits have been predominantly focused on 'reconciling environmental and development goals' [Mayrhofer and Gupta, 2016, p.22]. Yet, there is ambiguity regarding a clear-cut definition of the term 'co-benefit'. In addition, academic and policy literature reveals a great variety of terms used synonymously, such as ancillary benefits, win-win situations, and mainstreaming [Floater et al., 2016]. Besides these interchangeable terms with co-benefits, several studies framed inverse terms such as co-harms and adverse side-effects or comprising terms such as co-impacts that can be either positive or negative in their nature (benefits and drawbacks) [Spencer et al., 2017, Ürge-Vorsatz et al., 2014, IPCC, 2014b].

The Intergovernmental Panel on Climate Change (IPCC) defines co-benefits as 'positive effects that a policy or measure aimed at one objective might have on other objectives, irrespective of the net effect on overall social welfare' [IPCC, 2014b, p.1257]. In the context of climate policies this definition refers to '[co-]benefits independent of their direct [climate] benefits with respect to reducing vulnerability to climate change' [Ibid, p.910]. In other words, co-benefits of climate action go beyond primary climate benefits resulting from (1) climate change mitigation by means of greenhouse gas (GHG) reduction and (2) climate change adaptation CCA through '[t]he process of adjustment to actual or expected climate and its effects' [IPCC, 2014b, p.1251]. This adjustment refers to adaptive processes, actions and measures reducing the vulnerability to climate change impacts such as weather-related disasters (e.g. heat waves, heavy rain events, and storm surges).

Figure 1.1 conceptualises co-benefits of climate adaptation as understood in the further course of this study. Together with subsequent considerations on urban resilience (Section 1.2), the schematic illustration will be a point of departure for the problem analysis, as deduced in Chapter 2. The figure points out *scope*, *intentionality*, and *scale* as three dimensions of climate co-benefits [Floater et al., 2016]. A more detailed explanation of their definitions follows as part of the theoretical framework in Sub-section 3.2.1. Figure 1.1 illustrates CCA as the first *scope I* set addressing climate benefits and co-benefits defined as previously stated. The combined endeavour of reducing vulnerability to climate change and providing co-benefits as positive effects independent of climate benefits may lead to potentials of integration and alignment with broader development objectives (*scope II*). Here, these development objectives are defined in the context of resilience as a paradigm. According to Marchese et al. [2018], resilience development applies to 'more immediate temporal scales' then sustainability endeavours [Marchese et al., 2018, p.1279]. Resilience policies may entail short term impacts by prioritising integrated and immediate processes, while sustainability defines desired future outcomes [Ibid.]. Despite missing consensus on distinct definitions of resilience and sustainability, scholars seem to agree upon the necessity for the pursuit for both concepts in a complementary manner [Marchese et al., 2018, Redman, 2014]. This refers to the previously stated third way of co-benefits in the assistance of 'addressing existing development deficits while also meeting long-term sustainable development objectives' [IPCC, 2014b, p.910]. In the following, co-benefits of CCA are examined with regard to their contribution to 'existing development deficits' under the concept of urban resilience. Later theoretical considerations (Sub-section 3.2.1) introduce 14 defined social, economic, and environmental co-benefits and examine more in-depth the previously introduced aspects and dimensions of CCA co-benefits to provide a framework functioning as a theoretical reference for later analyses (Part III).

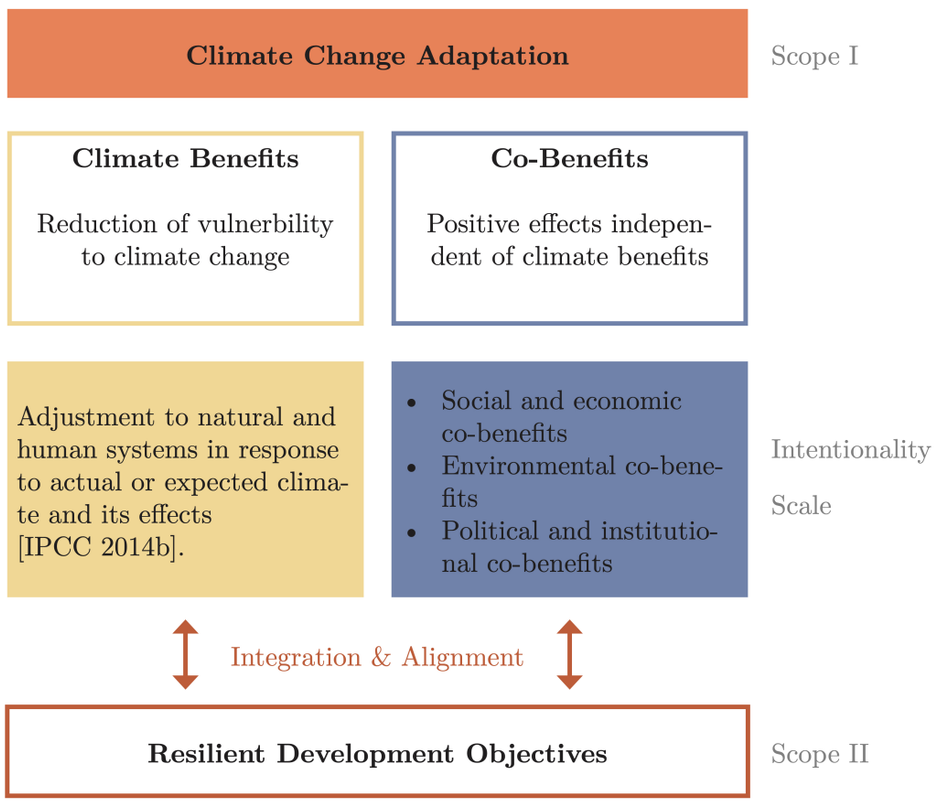

Figure 1.1: Climate benefits and co-benefits of climate change adaptation in relation to resilient development objectives.

1.2 Urban Resilience

The term resilience has its origin in the Latin word 'resilire' meaning 'to leap back' [Windle, 2011, p.154]. According to Garrett [2017], there is little agreement in literature about which discipline was initially introduced and used the term. Some argue the term resilience first appeared in physics to describe the ability of materials to resist stress in the form of, e.g. external forces and heat [Ibid.]. Others see resilience originated in the field of psychology where it is understood as 'the ability to rebound from acute or chronic adversity' such as psychological trauma [Vernon, 2004, p.13]. In the last two decades, resilience as a term has experienced a significant increase in use across multiple disciplines [Folke, 2016]. Multi-disciplinary perspectives on resilience come along with difficulties in pointing out a clear-cut definition [Windle, 2011]. However, there seems to be a consensus on resilience as the ability to withstand stress and the continuous '[well-]functioning under currently adverse conditions' [Windle, 2011, p.156]. This entails a dynamic dimension of resilience [Hornor, 2017, Windle, 2011]. This dimension is inherent in the interplay of social processes and ecological dynamics. In this context, Windle [2011] defines resilience as the extent of disturbance, a system can cope with 'without dramatic loss of complexity of [the system], rather than the speed at which the *status quo* can be restored after disturbance' [Ibid., p.155].

Global trends of urbanisation have introduced resilience as a prominent concept in an urban context [Folke, 2016]. A concept that promises 'to respond to major global challenges like urbanisation, development, climate change, and sustainability, and to implement global policies including the 2030 Agenda-Sustainable Development Goals, the Sendai Framework on Disaster Risk Reduction, the Paris Agreement, and the New Urban Agenda' [Brunetta et al., 2019, p.2]. In this context, the complexity of social-ecological systems and conceptual vagueness pose a challenge of operationalising urban resilience [Windle, 2011, Brunetta et al., 2019]. This challenges deals in the first instance with the question of bridging the gap between 'what urban resilience is and what urban resilience ought to be' [Brunetta et al., 2019, p.1].

A city often does not face only one shock but rather a combination of several challenges [100RC, 2019]. These challenges can be of a social, environmental, or economic character and are influenced by diverse aspects of governance, politics, and powers [Folke, 2016]. As a consequence, urban resilience can be best viewed as a cross-sectoral and multi-disciplinary concept challenged by the dynamics of the city [Olazabal et al., 2012]. Thus, urban resilience is dynamic in nature describing the 'return rate to [the city's] equilibrium upon a perturbation' [Folke, 2016, p.3]. (Notable is the question of how to define and locate the point of equilibrium, and to what extent this point is dynamic in itself.)

Figure 1.2 shows aspects and sectors of urban resilience that need to be considered as integrated into a dynamic interplay. For instance, the socio-ecological system (SES) and socio-technical systems (STS) describe dynamic constructs whose resilience depends on an interplay of social and ecological resilience factors, and social and technical resilience factors, respectively. Urban development following a shock needs to address multiple operational and structural aspects (cf. Figure 1.2) since perturbation may emerge cross-sectorally and may not only have one cause and driver [Olazabal et al., 2012]. According to Brown [2016], a resilience framework constitutes a lens through which the 'challenges characterised by high uncertainty, globalised and interconnected systems, increasing disparities and limited choices' may be understood [Ibid., p.i].

Figure 1.2: 'Multidisciplinary perspective of urban resilience' [Olazabal et al., 2012, p.7].

Beyond that, urban resilience has recently been received less as the ability of recovery to the state prior to the disturbance but more as including 'the ability to acquire new capabilities' [Wong-Parodi et al., 2015, p.1]. Exploring the 'transformability of urban systems' that goes beyond the development of 'reactive, recovery, and adaptive capacities' and opens up opportunities for innovation and socio-economic development [Olazabal et al., 2012, Mitchell and Maxwell, 2010, Walker et al., 2004]. According to Walker et al. [2004], transformability has been defined as 'the capacity to create a fundamentally new system when ecological, economic, or social (including political) structures make the existing system untenable' [Ibid., p.3]. By drawing 'on sources of resilience from [multiple] levels and scales' space for transformations can be uncovered enabling 'new ways of thinking and operating' [Folke, 2016, p.8].

Chapter 2

Problem Analysis

This chapter serves the purpose of providing a justification and contextualisation of this research work. The subsequent analysis builds upon the introduction in Chapter 1, seeking to examine and scope the problem formulation of the leading *Research Question* for later contextualised formulations in the form of three sub-questions (Section 4.4).
As already stated in Section 1.1, the concept of climate co-benefits has been examined by many scholars spanning a range of disciplinary research fields [Newell et al., 2018, Pearce, 2000, Mayrhofer and Gupta, 2016, Houghton and Castillo-Salgado, 2017, Raymond et al., 2017]. While some studies take their point of departure in concrete measures of climate actions (such as, e.g. nature-based solutions cf. Raymond et al. [2017]) some others address climate co-benefits on a broader regime-level (coined by Geels [2004]) by, for instance, investigating co-benefits in relation to climate policies (cf. Mayrhofer and Gupta [2016] and Bollen et al. [2009]). The later case requires trans-disciplinary considerations 'that also looks at the politics and institutional aspects of co-benefits' [Mayrhofer and Gupta, 2016, p.22].

Since the concept of co-benefits has been coined as central in the endeavour of combating climate change [IPCC, 2014c,b], the demand for frameworks that make the theoretical concept applicable to a practical context increases. As a consequence, the following two underlying assumptions need to be considered: (1) climate co-benefits concepts may have a material impact, and (2) theoretical considerations on climate co-benefits can be translated into meaningful, practical measures. First, this poses questions of the character of co-benefits impacts as well as the assessment of their relevance. Spencer et al. [2017] argue that the 'pursuit of co-benefit approaches becomes increasingly valuable when it is possible to verify their impacts and their actual co-benefits'. This verification presents not only a challenge of identifying targeted indicators for the effectiveness of co-benefit frameworks but also the consideration of different real-world contexts depending on the local conditions. According to Ürge-Vorsatz et al. [2014], contextual factors determine the impacts of a co-benefits in such a way that their relevance may change from one stakeholder to another. Thus, 'operationalisation and tailoring [of co-benefit frameworks] to city-specific institutional circumstances' is crucial [Raymond et al., 2017, p.16]. Leading to the second question of how theoretical frameworks may inform the practical implementation of co-benefit concepts. Current literature demonstrates a lack of contestations concerning the usage of co-benefit approaches in practice [Mayrhofer and Gupta, 2016]. In other words, application-oriented frameworks that 'guide cross-sectoral project and policy design and implementation' are still lacking [Raymond et al., 2017].

As pointed out in Section 1.1, several research projects on co-benefits occur in the context of resilience [Connop et al., 2016, Raymond et al., 2017, Floater et al., 2016, Fung and Helgeson, 2017]. Google Scholar presents 43,500 results for a search on 'climate co-benefits' (status as of March 2020). Adding 'resilience' to the terms in the search field results in 15,500 hits. Thus, one third of the research on climate co-benefits seem to take resilience concepts in one way or another into account. According to Floater et al. [2016], the following three areas tend to be addressed by current co-benefit frameworks: (1) green economy, (2) cost-benefit approaches,

and (3) resilience framework.

However, how co-benefit approaches are conceptualised in resilience frameworks remains vague. Studies on co-benefits that address resilience thinking consider resilient development as a targeted objective standing firm as a guiding paradigm. Thus, climate resilience as an underlying approach is rarely put into direct relation with co-benefit concepts. In other words, questions on how co-benefit concepts may contribute to urban resilience or how resilient frameworks can incorporate co-benefit approaches remain unacknowledged.

Resilience concepts need inevitably to operate across multiple sectors. Multi-sector and multi-actor becomes particularly evident by referring to the seven Characteristics of Resilient Systems established by 100RC (Figure 3.4). Two of these characteristics claim that urban resilience requires (1) 'to prioritise broad consultation to create a sense of shared ownership in decision making' and (2) 'to bring together a range of distinct systems and institutions' [100RC, 2019]. This requires an acknowledgement of the complexity of resilience [Windle, 2011, Duit et al., 2010]. The complex multilevel interactions of different systems, institutions and stakeholders confront governance structures [Duit et al., 2010]. In this context, it must be questioned if the degree of complexity, inherent to resilience thinking, requires a reconsideration of governance models addressing 'fundamental issues of change and stability, adaptation and design, hierarchy and self-organisation' [Duit et al., 2010, p.365].

The previous paragraphs pointed out two major challenges: (1) the relevance of climate co-benefits in the context of urban resilience and (2) the obstacle of bridging the gap between theoretical concepts and practical application. Furthermore, this Section revealed considerations of governance structures and institutional aspects as crucial parts of the discussion on climate co-benefits and urban resilience. As stated before, investigating co-benefits in relation to climate policies requires trans-disciplinary considerations 'that also look at the politics and institutional aspects of co-benefits' [Mayrhofer and Gupta, 2016, p.22]. In this context and taking up the relevance of co-benefits in resilience thinking, as above argued for, the question of *why co-benefits of climate change adaptation matter and how they can contribute to urban resilience* becomes considerable. Referring back to first considerations on Denmark and its expected climate change impacts and need for coastal adaptation, the following leading *Research Question*:

> *Why do co-benefits of coastal adaptation matter and how can they contribute to the resilience of coastal communities?*

II | Research design

Taking a point of departure in the Iceberg Model (see Figure 2.1), this chapter represents the overall research design underlying this study, including methods for data collection and generation, the case study design as well as the addressed underlying 'hidden assumptions of research' [Farthing, 2016, pp.23-24]. These hidden assumptions may often not be evident for the reader when solely focusing on the result of a research work. Metaphorically spoken, they are the hidden part of an iceberg lying under the water surface. By pointing out the hidden assumptions of this study, this chapter aims to answer 'why the research was conducted in the way, it was [Ibid., p.23]. According to Farthing [2016], addressing this question is essential since it 'underpins the trustworthiness of the claims that [are made in this study]' [Farthing, 2016, p.2].

The part is divided into four chapters. First, Chapter 3 comprises four sections on fundamental assumptions of theoretical considerations on (1) Philosophy of science, (2) theories and concept, and (3) case study research. In Chapter 4, an argument for *Vejle as a case* is brought forth. In addition, this chapter provides information on the local context of Vejle, the local significance of urban resilience, and formulates the resulting problem in the form of the leading Research Question and three sub-questions. Hereafter, Chapter 5 represents the methods of data generation which were chosen with regard to the three sub-sections pointed out in Section 4.4. The last chapter provides a structured overview of the research design in the form of a framework linking all presented parts of this chapter together. This part points out the logic and causality of this research and functions as a guideline for the subsequent analyses in Part III, leading to the discussion and, eventually, the conclusion of this research work (Part IV).

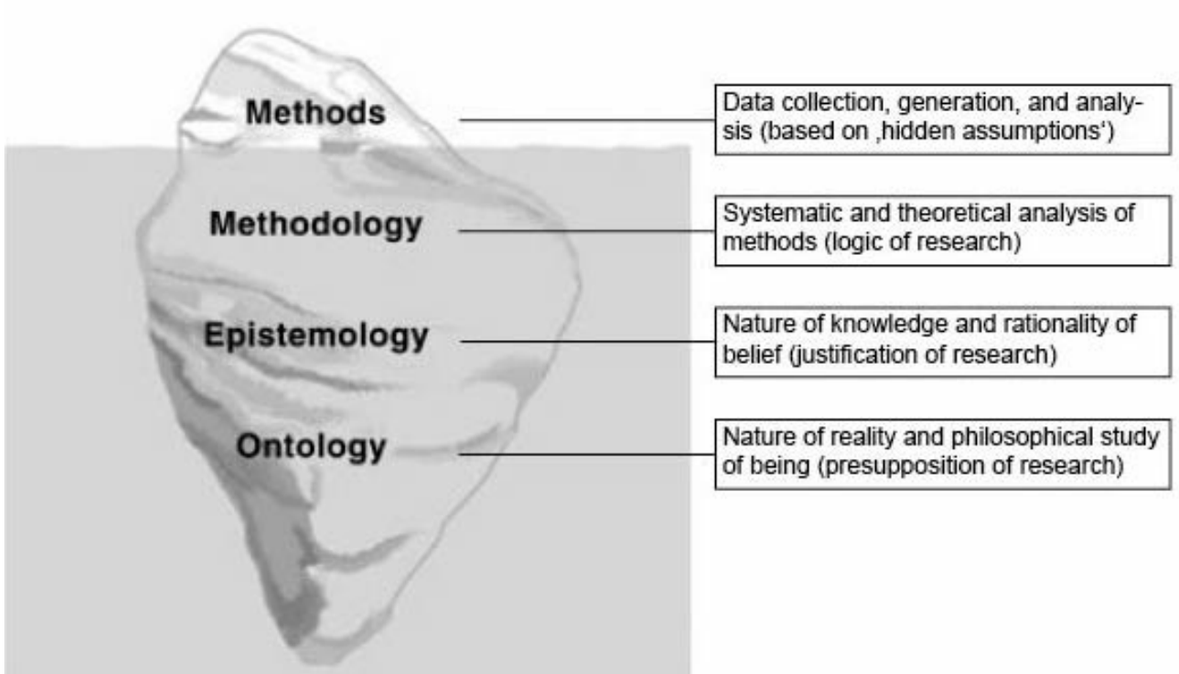

Figure 2.1: 'Hidden assumptions in research: the Iceberg Model' [Farthing, 2016, Bryman, 2012].

Chapter 3

Theory

This chapter comprises four sections on fundamental assumptions of theoretical considerations. First, Section 3.1 represents the philosophy of science approach addressing the scientific rationale, the 'hidden' research conception including ontological and epistemological considerations, and an overall understanding of the social world. Second, Section 3.2 consists of the subject-relevant theories and concepts that will represent the theoretical lenses through which later results will be analysed (Part III). Thereupon, Section 3.3 describes the basic conception of case study research, including theoretical considerations for a reasonable choice of case, a justification for the case study as a research strategy, and point of departure for later analyses for *Vejle as a case* in Chapter 4.

3.1 Philosophy of Science

This section presents the underlying research conception addressing the 'assumptions about what the social world is like' by answering questions about the nature of knowledge (ontology) and how we can know about this knowledge (epistemology) [Farthing, 2016, p.14]. Referring back to the allegory of the Iceberg Model (2.1), ontological and epistemological considerations are the 'hidden assumptions' that represent a socio-philosophical rationale behind the 'visible' research [Ibid., pp.23-25]. The importance of this rationale lies in its inference for the research design, as discussed in Section 3.1.2.

Urban planning transgresses multiple disciplinary boundaries [Pinson, 2004, Rahmaan, 2011]. According to Bagaini et al. [2017], 'a multidisciplinary approach is necessary to understand the complexity of urban phenomena meeting social, economic and environmental needs' [Bagaini et al., 2017, p.1]. As a consequence, the research field of urban planning acquires knowledge in social, political, and engineering as well as natural science. On the one hand, urban planning in the field of CCA relies on natural and engineering science by providing knowledge about expected climate change impacts, their assessment, and potential technical responses. On the other hand, social science approaches need 'to be used in understanding the dynamics of vulnerability' while political guidance is crucial to ensure integrated actions [Lim et al., 2004, p.79].

Concepts of co-benefits and urban resilience can contribute to guiding frameworks fostering integrated actions. However, they require among others a fundamental understanding of the dynamics in SES and STS (cf. Figure 1.2) influenced by political and cultural landscapes pervaded by power relations [cf. Geels, 2004]. The questions raised are (1) how do we interpret this understanding, and (2) how do we decide on what counts as knowledge? In this process of reasoning, the researcher themself does not act in a political vacuum as do not all other people involved in the research process. As a consequence, social actors, including the researcher, are constantly reshaping the social world influenced by their perception and experiences.

3.1.1 The Paradigm of Post-Positivism & Social Constructivism

The previously made assumptions lead to a position of social constructivism claiming that 'social phenomena and their meaning are continually being accomplished by social actors' where the researcher is part of the accomplishment [Bryman, 2012, p.710]. The conception that 'reality is socially constructed' is an ontological underpinning of a post-positivist stance [Berger and Luckmann, 1966, p.13]. Post-positivism has its origin in a critique of positivism by, first, rejecting its ontological naturalism claiming the existence of only one type of subject matter, resulting in view positing that there is no difference between humans and subjects of natural sciences [Allmendinger, 2002, Bryman, 2012]. Second, post-positivism questions the following positivist epistemological principles:

- 'Knowledge is arrived through the gathering of facts that provide the basis for laws [...];
- Science must (and presumably can) be conducted in a way that is value free (that is, *objective*) [...];
- There is a clear distinction between scientific statements and normative statements [...]' [Bryman, 2012, p.28].

As a consequence, post-positivism is characterised by approaches that contextualise theories in social contexts and acknowledge their ubiquitous variance [Allmendinger, 2002]. Furthermore, it argues for 'an understanding of individuals as self-interpreting, autonomous subjects' [Ibid., p.87]. To sum up, 'reality is socially constructed and that the sociology of knowledge must analyse the process in which this occurs' [Berger and Luckmann, 1966, p.13]. In other words, post-positivism claims that social actors are dependent upon their constructions and that knowledge is always part of ongoing constructions.

What follows for the researcher? How can they acquire knowledge under a post-positivist paradigm? The latter epistemological question entails phenomenological considerations addressing the objective study of consciousness and 'perceptual experiences' [Smith, 2013, Schutz, 1972]. This refers to 'more "bottom-up" interpretative understandings [...] that emphasise the reflective nature of individuals and their ability to choose' [Allmendinger, 2002, p.91]. Complementing the previously stated questions leads to: *How can the researcher acquire objective knowledge about the social world by knowing that it is subject to subjectivity?* This question leads to the subsequent section examining the inferences of a post-positivist approach in planning research.

3.1.2 Inference for Planning Research

In order to answer the above-posed question, it is essential to investigate what 'post-positivism means[s] for our understanding of planning theory' and what impact it has on the planning researcher themself [Allmendinger, 2002, p.88]. This requires a multi-dimensional analysis of the impact of (1) a post-positivist perspective on planning theory and methodology and (2) how the researcher subjectivity informs their interpretation of these.

Allmendinger [2002] emphasises four principles for a post-positivist interpretation of planning theory:

- All theory is normative influences by values and the social context;
- Thus, theory can only be interpreted in a specific context;
- That implies that theory is formulated, interpreted and applied differentially through time and space;

- As a consequence, 'there is no distinction between substance and procedure but a complex iterative relationship between ideas and action' [Allmendinger, 2002, p.89].

I argue that these principles are also valid for the methodology and methods applied by the researcher. The latter principle refers to a pragmatic worldview that 'arises out of actions, situations, and consequences rather than antecedent conditions' [Creswell, 2014, p.10]. In order to understand these dynamics and their pluralism, pragmatic research emphasises a research strategy of mixed methods, qualitative and quantitative ones [Ibid.]. However, some scholars argue that a mixed-method approach is not a necessity when the intended consequences only require a single method strategy [Kaushik and Walsh, 2019, Teddie and Tashakkori, 2003]. Pragmatic research aims at looking to 'the what and how to research based on the intended consequences' and dependent on the social and political context [Creswell, 2014, p.11]. In this respect, pragmatist researchers usually follow an abductive research strategy where 'research becomes a dialogue between data and theory mediated by the researcher' [Blaikie, 2010, p.156]. This dialogue can be understood as an iterative process and interplay of validating theory, generating 'tentative hypotheses' and inferences to best explanations [Ibid.]. As a consequence, in a pragmatic worldview translating epistemological considerations into a methodological framework entails some challenges [Kaushik and Walsh, 2019].

The following Figure 3.1 visualises the derived implications for the research design of this study concerning the previously made considerations in the context of post-positivism, social constructivism, and pragmatism. In this context, it attempts to outline the overall scientific rationale, including inferences for the choice of methodology and methods.

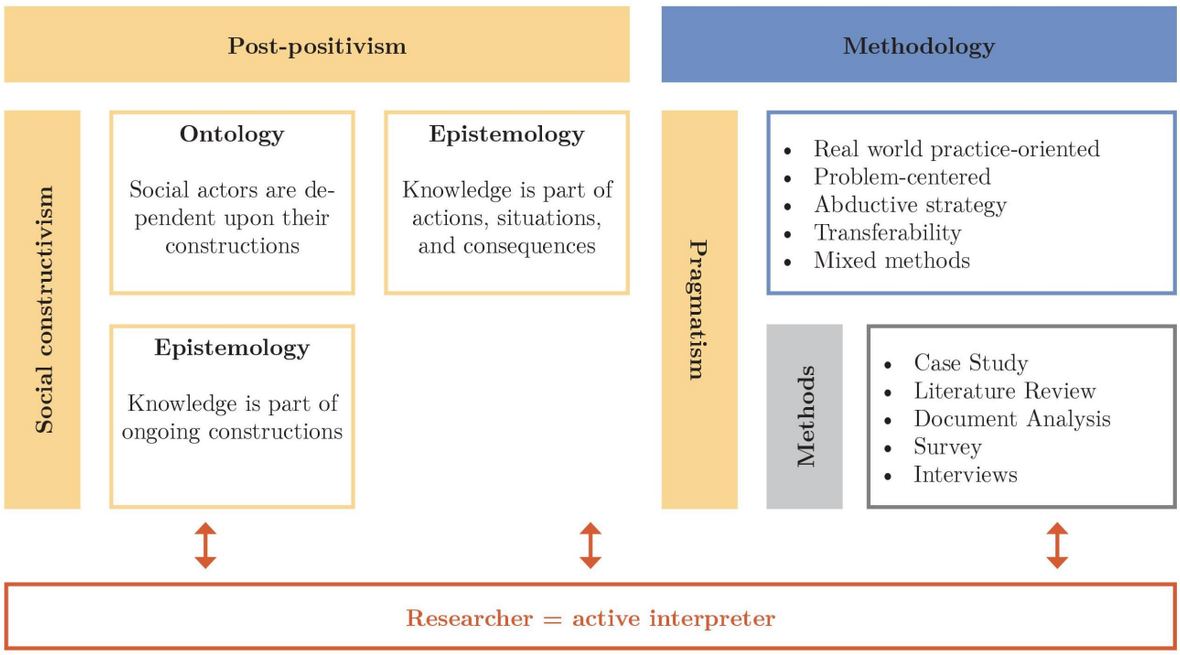

Figure 3.1: Scientific rationale (referring to post-positivism, social constructivism, and pragmatism) and inferences for the research design [own elaboration based on Creswell, 2014, Guba, 1990, Allmendinger, 2002, Kaushik and Walsh, 2019, Berger and Luckmann, 1966].

3.2 Theories & Concepts

This section points out and describes the relevant theories and concepts for the conceptual framework, as presented in Sub-section 3.2.4. The derivation of the conceptual framework takes its point of departure in the conceptual problem of 'how to develop a conceptual framework relevant to the underlying problem formulation'. This implies the design of a theoretical framework that (1) explains why the research problem under study exists and (2) guides and informs the analysis process of the study (cf. Figure 6.1). To this end, theoretical considerations in

three fields of planning research are made: Sub-section 3.2.1 elaborates beyond the introduction of co-benefit concepts (Section 1.1) and formulates a framework including a classification and taxonomy of CCA co-benefits. The second section represents a framework for urban resilience, referring to the 100RC framework as it guides Vejle's Resilience Strategy and thus endeavours of resilient development. Last but not least, Sub-section 3.2.3 examines aspects of *Institutional Analysis* addressing *Institutional Theory* and considerations of institutional design of climate adaptation planning.

3.2.1 Framework for Adaptation Co-Benefits

This sub-section builds upon the introductory part of co-benefits (Section 1.1) by examining introduced aspects more in-depth. This section aims to uncover relationships between aspects and dimensions of co-benefit approaches, to elaborate beyond the conception represented in Section 1.1 and develop a guiding framework for later analyses (Part III). As a point of departure serves the following definition of CCA co-benefits (cf. Figure 1.1):

> 'Social, economic and environmental benefits independent of their direct adaptation benefits with respect to the reduction of vulnerability to climate change impacts such as weather-related disasters (e.g. heat waves, heavy rain events, and storm surges) by, for instance, reducing the risk of flooding and increasing local thermal comfort.'

Floater et al. [2016] undertook a comprehensive literature review on climate co-benefits of policy actions with the objective of producing 'a co-benefit framework to support a shared language for, and common understanding and measurement of, co-benefits' [Ibid., p.7]. Their motivation lay in capturing 'the full landscape of co-benefits comprehensively' [Floater et al., 2016, p.5]. While Floater et al.'s [2016] endeavours are directed towards a guideline for bridging the gap between theoretical and practical implementation, this section addresses 'only' the theoretical considerations needed for further practice-oriented analyses (Part III). In other words, it focuses on the elaboration of a classification and taxonomy of CCA co-benefits, a consistent theoretical understanding, that is a prerequisite for analysing their significance and implementation in the broader planning process of Vejle's Storm Surge Strategy.

Classifications of CCA Co-Benefits

Table 3.1 shows a number of 14 environmental, social, and economic co-benefits. This classification does not imply any claim of completeness but represents a summary of environmental, social, and economic climate co-benefits of adaptation measures as addressed by the majority of literature in the field of research [cf. Raymond et al., 2017, Newell et al., 2018, Floater et al., 2016, Ürge-Vorsatz et al., 2014]. However, this classification aims to provide an overview of potential co-benefits to get an insight into the potential positive side-effects of adaptation measures. However, it is essential to notice that there is no one 'ideal' ultimate classification that covers distinct and independent co-benefits. Many of the co-benefits may have interrelated characteristics and/or impacts across different sectors. In this context, Ürge-Vorsatz et al. [2014] emphasise the importance of rather identifying causal relationships and interactions among co-benefits than only focusing on the elaboration of taxonomies with inherent shortcomings. Hence, [Ürge-Vorsatz et al., 2014] argue for 'considering co-benefits in a multiple-objective/multi-impact framework rather than in a single-purpose co-benefit one' [Ibid., p.551], where its importance and implementation into planning processes is an integral part of this study.

Table 3.1: Environmental, economic, and social co-benefits of CCA measures *(Note: 'Reduced GHG emissions' may be assumed as a mitigative co-benefit).*

Environmental	Social	Economic
Improved air quality	Reduced health impacts	Employment and income generation
Reduced GHG emissions	Increased access to public space	Cost savings
Improved water quality	Increased aesthetic value	Innovation and investment
Improved water collection and security	Increased community cohesion and inclusion	Increased property value
Increased biodiversity		
Reduced landslide and erosion		

The following Figure 3.2 gives an example of a net of causal relationships of climate-adaptive benefits and co-benefits of nature-based solutions. Such solutions are 'broadly defined as solutions to societal challenges that are inspired and supported by nature' [Raymond et al., 2017, p.15]. Even if there will be no further illumination of concrete CCA measures (- since the focus lies on the significance and integration of their co-benefits into the planning process -), the example of nature-based solutions functions as a useful example to point out the potentially wide impact of CCA co-benefits. These impacts are not bidirectional. However, the inherent interdependencies of co-benefits may cause cascading effects that reinforce the intertwining across environmental, social, and economic impacts. (The economic benefits entailed by a reduction of flood risk or the health benefits resulting from an increase of thermal comfort should be regarded independently from co-benefits as direct climate benefits. However, Figure 3.2 shows links connecting climate benefits with elements of co-benefits that avoids an additional illustration of the same impact for the purpose of simplicity.)

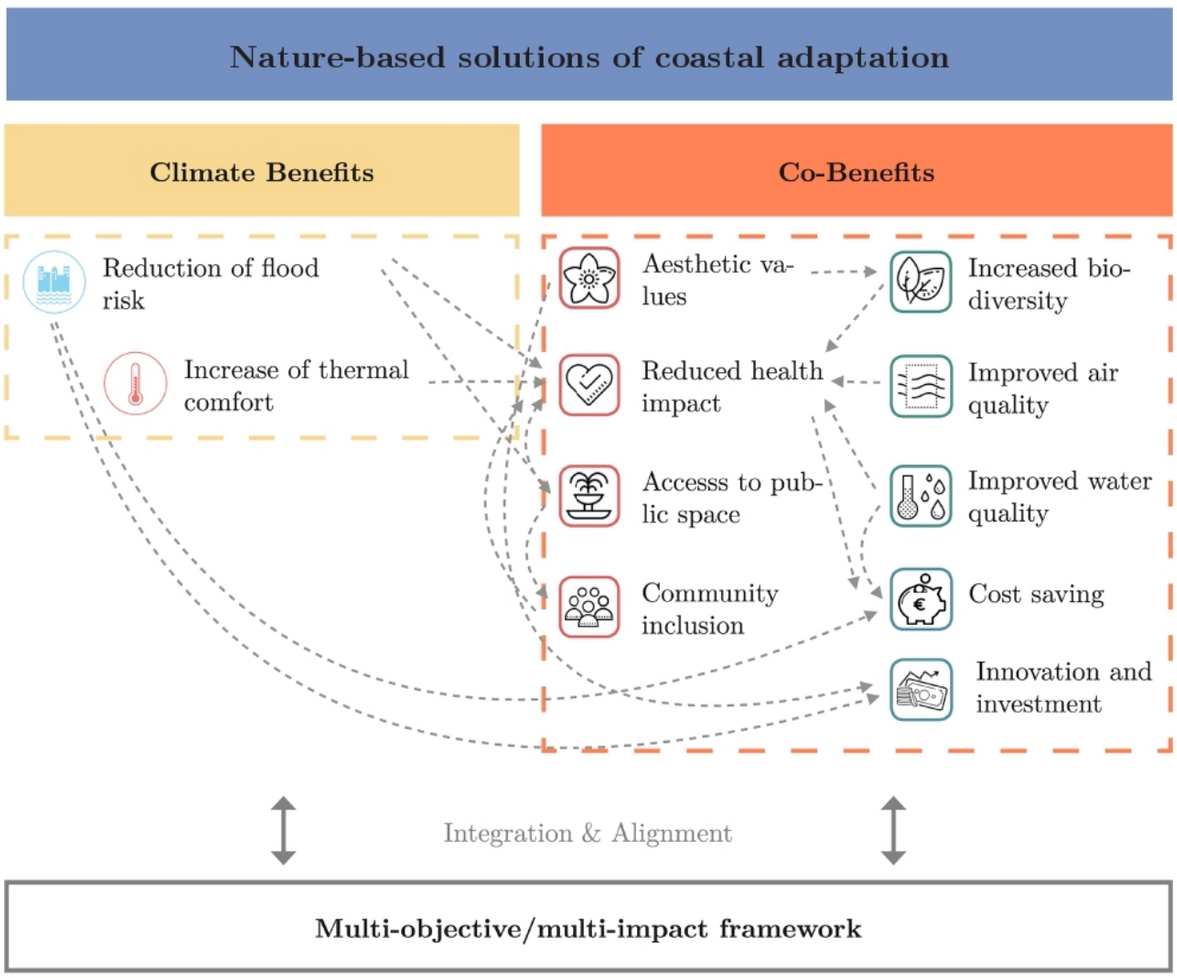

Figure 3.2: Causal chain of interrelations among climate benefits and co-benefits of nature-based solutions.

Taxonomy of CCA Co-Benefits

As touched upon in Section 1.1, the literature reveals three main dimensions that should be considered when conceptualising climate co-benefits for policy purposes: (1) intentionality, (2) scope, and (3) scale. Here, intentionality scrutinises if co-benefits of climate actions are incidental or intentional and if intentionally sought they may arise as (1) primary objectives, (2) secondary objectives, or (3) among several simultaneous objectives in an integrated policy approach. As a result, the primary focus of a policy lies either on (1) climate benefits, which result in other non-climate co-benefits, (2) non-climate benefits which result in climate co-benefits, or (3) an integrated approach which targets climate and non-climate benefits equally weighted and simultaneously. [Floater et al., 2016]

The second dimension of *scope* determines whether climate benefits capture climate mitigation, adaptation, or both. Furthermore, Floater et al. [2016] refer *scope* to a broader focus on 'sustainable development considerations including economic, social, and environmental net-benefits' [Ibid., p.15]. Since this study focuses on actions of CCA, the second dimension of scope refers to three ways of how co-benefits may arise as defined by IPCC [2014c]: (1) stimulating action on CCA, (2) 'generation of climate adaptation goods and services' and (3) 'advancing sustainable development' [Ibid., pp.910-911]. First, by emphasising co-benefits of CCA actions, awareness may be raised, and further actions may be stimulated that capitalise on opportunities [IPCC, 2014c]. Second, adaptation planning and implementation require resources and knowledge that can foster potential economic adaptation goods and services such as technological solutions and risk assessment [Ibid.]. Third, co-benefits of CCA can contribute to the achievement of sustainable development objectives by providing (net-)benefits across different spheres of sustainability.

Last but not least, the third dimension of co-benefits considers temporal and geographical scales by addressing questions such as 'Does the impact of co-benefits evolve or alter over time?' and 'Does the CCA co-benefit emerging on a local level support national or global action?'. These questions address one of the major challenges with regard to the assessment of co-benefits since this requires methods that take 'the changing dynamics of the system at a variety of geographic and temporal scales' into account [Raymond et al., 2017, p.21]. This problematisation refers to the potential disconnection between the net effects of short-term and long-term co-benefits since their different environmental, economic, and social impacts may evolve and unfold over different periods of times. However, most of the social (or welfare) co-benefits (see Table 3.1) entail immediate effects benefiting the wellbeing of the citizens.

3.2.2 Framework for Urban Resilience

This sub-section builds upon the introduction of the concept of urban resilience, as undertaken in Section 3.2.2. Vejle's 'partnership with 100RC has been a major driving force for the development of Vejle's resilience strategy' [Vejle Kommune et al., 2016]. For this reason, the main focus of the following two sub-sections is the understanding of (1) the 100RC Framework and (2) characteristics of resilient systems. In sub-section *Characteristics of Resilient Systems*, the resilience characteristics as determined by [100RC, 2019] are pointed out and are further examined. This examination expands beyond the 100RC's [2019] definitions and illuminates semantics of the characteristics as understood by other scholars in the research field of urban resilience.

The 100RC is a network of 100 global cities that supports cities around the globe to become more resilient to climate change impacts. The international organisation was launched in 2013, funded by the Rockefeller Foundation. The ambitions of the 100RC organisation have lain in addressing the following two questions: (1) *'What are the characteristics and capacities of a city that can adapt and grow in the face of [...] [chronic stresses and acute shocks]?'* and (2) *'What distinguishes a resilient city from one that collapses in the face of disruption and adversity?'* [100RC, 2019]. In the endeavour of answering these questions, 100RC established 'a common set of factors and systems that enhance a city's ability to survive, adapt and grow in the face of adversity' [Ibid.]. In July 2019, the program of the 100RC was concluded. After six years, the network encompassed 100 member cities that have launched 80 Resilience Strategies. The former 100RC senior staff plan for a future of continued collaboration and information sharing amongst cities looking to advance resilience solutions that improve the lives of poor and vulnerable people in their communities. A new grant of 8 billion USD by the Rockefeller Foundation will ensure further support of the 100RC member cities to benefit from continuing collaboration and knowledge sharing towards advance resilience solutions. [100RC, 2019, Rockefeller Foundation, 2020]

The 100 Resilient Cities Framework

The City Resilience Framework (CRF) is the product of the endeavour to establish a systematic answer to the aforementioned questions on (1) the characteristics and capacities of a city to cope with stresses and shocks and (2) the distinct characteristics between a resilient city and a collapsing city. As illustrated in Figure 3.3, the CRF focuses on four dimensions: Health & Wellbeing, Economy & Society, Infrastructure & Environment, and Leadership & Strategy, which contain three 'drivers', respectively. The 12 drivers describe actions that can be taken by cities to improve their resilience. The CRF is understood as a tool enabling cities to reveal the strengths and weaknesses of their urban systems. Furthermore, it facilitates to explore

interdependencies of different objectives and to locate the cities' capacities. As it would go beyond the scope of this study to undertake an in-depth analysis of every driver, the CRF and its dimensions are rather perceived as an orientation and point of departure for the following argumentation on 'characteristics of resilient urban systems' as following in the subsequent section. [100RC, 2019]

Figure 3.3: The 100RC Framework [The Rockefeller Foundation and Arup, 2015, p.9]

Characteristics of Resilient Systems

Within the CRF 100RC set up the following seven 'characteristics of resilient systems': (1) reflective, (2) resourceful, (3) inclusive, (4) integrated, (5) robust, (6) redundant, and (7) flexible (cf. Figure 3.4). After a comprehensive literature review of various works [i.a. Godschalk, 2003, Kim and Lim, 2016, Wardekker et al., 2010] in the field of urban resilience Ribeiro and Pena Jardim Gonçalves [2019] pointed out eleven characteristics of resilient urban systems. While five characteristics by Ribeiro and Pena Jardim Gonçalves [2019] formulate a common definition with the '100RC characteristics', six characteristics either appear in another formulation or expand beyond the seven characteristics in Figure 3.4. These characteristics are diverse, efficient, connective, adaptive, independent, and innovative [Ribeiro and Pena Jardim Gonçalves, 2019, p.7].

Diverse refers to the 'existence of several functionally different components to protect the system against the various threats [and to adapt it to a wide range of diverse circum-

stances]' [Ribeiro and Pena Jardim Gonçalves, 2019, p.7]. In this context, Ribeiro and Pena Jardim Gonçalves [2019] argue that the more diverse a system is, the better is its ability to adapt. Skimming the dimensions of the CRF this characteristic appears in several drivers such as 'diverse livelihoods', 'diverse provision and active management [of critical services]' and 'diverse and affordable multi-modal transport systems and [...] communication [...] networks' [The Rockefeller Foundation and Arup, 2015, p.7]. Having a closer look at the definitions by 100RC [2019] the characteristic *integrated* encompasses diversity by 'bringing together a range of distinct [diverse] systems and institutions' [Ibid.].

Efficient is understood as the positive interplay between the static and the dynamic urban system [Ibid., p.7]. In this context, efficiency describes the speed at which an urban system can 'quickly recover its previous state' [Kim and Lim, 2016, p.3]. Thus, efficiency is highly dependent on redundancy described as the size of capacity to accommodate disruption [100RC, 2019]. Moreover, Ribeiro and Pena Jardim Gonçalves [2019] point out *connective* as the characteristics of system components being essential for support and mutual interaction. This attribute may be referred to as *integrated* defined as 'bring[ing] a range of distinct systems and institutions together' [100RC, 2019]. It also appears in drivers of the CRF (Figure 3.3) as, for instance, in 'promoting well-connected communities' or in 'creating daily connectivity between places, people and services' [Ibid., p.11-12].

According to 100RC [2019], *reflective* is understood as 'using past experience to inform future decisions', and *flexible* is defined as 'willingness, ability to adopt alternative strategies in response to changing circumstances'. Ribeiro and Pena Jardim Gonçalves [2019] refer to these two characteristics with the attribute 'adaptive' describing the 'ability to learn from experience and be flexible in the face of change' [Ibid., p.7].

Independent may be understood in the ability of a system to continuously operate after disaster independent from external interventions [Ribeiro and Pena Jardim Gonçalves, 2019, p.7]. This characteristic is closely related to *redundant* described as the 'spare capacity purposefully created to accommodate disruption' [100RC, 2019]. Last but not least, Ribeiro and Pena Jardim Gonçalves [2019] reveal *innovative* as a characteristic describing the 'ability to quickly find different ways to achieve goals or meet their needs' when an urban system is under shock or stress [Ibid., p.7]. By illuminating and comparing the different characteristics, I argue for a set of characteristics of urban resilient systems, as seen in Figure 3.4. Seven of the characteristics (in blue) were taken over by 100RC [2019] and supplemented by an additional one (*innovative*) as deduced by the proceeding examination and pointed out by [Ribeiro and Pena Jardim Gonçalves, 2019].

Figure 3.4: Seven characteristics of urban resilient systems as defined by 100RC [2019] (in blue) complemented by an additional one *innovative* (in yellow).

3.2.3 Institutional Analysis

Reviews of literature reveal no clear-cut definition for governance Rhodes [1996], Stoker [1998], Peters and Pierre [2008]. Yet, there seems to be a consensus of understanding governance as a conception of interactive processes 'coordinating public and private interests' [Pierre, 1999]. According to Rhodes [1996], governance can be understood as a concept that expands beyond the traditional institutions of government, and it moves away from their monopoly of legitimate coercive power. This leads to an understanding of governance as a 'structure or order [...] [that] is the result of the interaction of a multiplicity of governing and each other influencing actors' [Kooiman and Vliet, 1993, p.64]. Hence, 'government is not just about government anymore' but rather an 'interconnected web of public, private, and nonprofit actors' [Wachhaus, 2014, pp.1] including multiple interests. According to Peters and Pierre [2008], the essence of governance lies in the pursuit of these interests in a collective manner through means of 'collective objectives and goals' [Ibid., p.242]. This implies a shift from governing to governance regarding the way and location in which decisions are made, resulting in decision-making processes that involve various institutional arenas that span across multiple sectors.

Climate change adaptation is embedded in various institutional processes that determine the 'feasibility or effectiveness of the mechanisms through which responses are put into actions' [Sanchez-Rodrigues et al., 2008, p.3]. According to Griffiths et al. [2007], the ability to adapt in response to a changing climate depends on 'institutional framework[s], policies developed, capabilities developed to innovate and speed of adaptation' [Ibid., p.415]. Furthermore, Griffiths et al. [2007] argue that deficiencies and resistance of institutions lead to limited institutional capacity to implement adaptation strategies successfully. One of these deficiencies may be the disconnect between adaptation planning and everyday decision-making, influenced by the disconnect of the natural world and everyday life [Griffiths et al., 2007, Healey, 1997]. This perspective gives rise to questions about the interactions among 'formal' and 'informal' institutions and how they influence 'social relations interlinked with ecological ones' [Healey, 1997, p.185]. The following Figure 3.5 provides an overview of an institutional framework anticipating concepts and notions that will be discussed later in this section. As for the preceding two sections, the figure is placed in the introductory part to provide the reader with a reference scheme; they can return and relate to during the reading process.

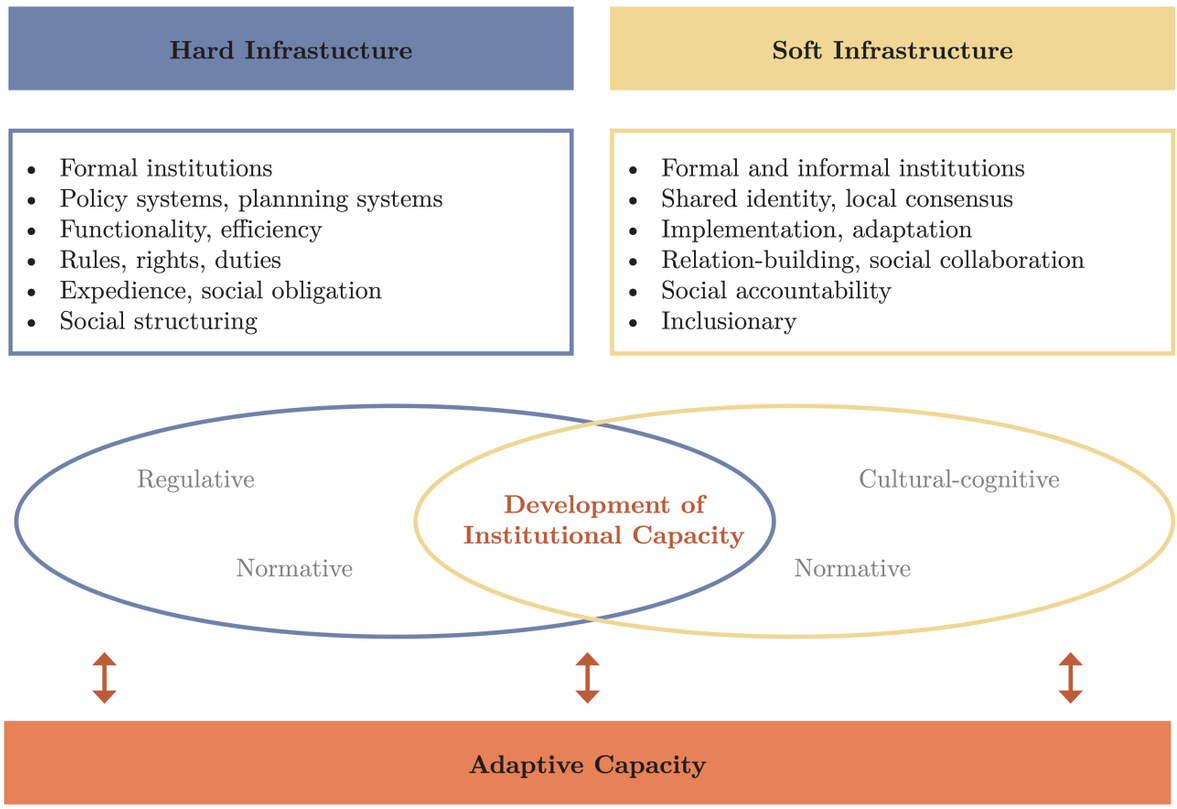

Figure 3.5: Framework of institutional design of climate-adaptive planning based on Healey's [1997] notions of *hard and soft infrastructure*, Scott's [2013] 'Three Pillars of Institutions' and institutional capacity development.

Institutional Theory

One of the early proponents of institutional theory is Weber. The importance of his work lies in the 'construction of meaning' and the identification of 'ideas with relevance for institutionalisation processes' [Lepsius, 2017, p.1]. According to Weber [2017], social relations, institutions, and groups influence 'all spheres of culture without exception' [Ibid., p.65]. By focusing on economic phenomena, he claimed that knowledge of institutions and 'the scientific analysis of their structure' was a prerequisite to interpret these phenomena [Weber, 2017, p.88]. In this context, Weber [2009] emphasised the importance of understanding 'the state as an institution which enjoyed a monopoly of legitimate force' [Ibid., p.xxvi]. He ascribed the bureaucratic structures a dominant order solely striving for functional order [Healey and Hillier, 2008].

In recent decades, research has moved away from focusing on formal institutions as the only source influencing governance [Peters, 2016]. There has been increased attention to the interplay of formal and informal arenas and how they are embedded, interact, and interlock with society [Peters and Pierre, 2008, Healey and Hillier, 2008]. This perspective has led to various conceptions that equate the embeddedness with the 'ability to change (or maintain) institutions' [Cardinale, 2018, p.133]. As for governance, there is an ambiguity regarding the nature of institutions. Peters [2016] claims that due to the 'internal diversity in institutional approaches' and their role in governance, the capacity of institutionalism has been limited [Ibid., p.309]. However, he argues for points of agreement that are illuminated in the following two sub-sections. In the first sub-section, institutions are defined as understood in this study. This definition represents the point of departure for Healey's [1997] notion of *soft and hard infrastructure*, in the second sub-section.

Defining Institutions

As aforementioned, the term 'institution' is ambiguous in its understanding and interpretation among scholars. The following two definitions by Jessop [2001] and Scott [2013] represent a

good point of departure since they bring into picture the multifaceted nature of institutions described as 'durable social structures':

> '[Institutions may be regarded as] social practices that are regularly and continuously repeated, that are linked to defined roles and social relations that are sanctioned and maintained by social norms, and that has a major significance in the social structure' [Jessop, 2001, p.1220].
>
> 'Institutions comprise regulative, normative, and cultural-cognitive elements that, together with associated activities and resources, provide stability and meaning to social life' [Scott, 2013, p.56].

According to Scott [2013], these regulative, normative, and cultural-cognitive elements are '*the* vital ingredient[s] of institutions' [Ibid., p.59]. Table 3.2 defines the three elements (pillars) with regard to seven dimensions, which represent the foundation for argumentation around the discourse of institutions among scholars [Scott, 2013]. While the regulative element constrains behaviour by indicators such as rules, laws, and sanctions, the normative element influences systems and behaviour by norms and values, creating a social obligation. The third element refers to 'shared conception [and beliefs] that constitute the nature of social reality' [Scott, 2013, p.67]. Referring back to Jessop's [2001] definition, it becomes evident that the three elements are addressed by notions such as 'regularly, sanctioned and maintained' (regulative), 'defined roles and social norms' (normative) and 'continuously repeated social practices and social relations' (cultural-cognitive).

According to Healey [1997], the three pillars of institutions are interlinked 'as the norms of behaviour and routines of practice [normative elements] [are] embedded in particular histories and geographies' [Ibid., p.324]. These 'histories and geographies' can be understood as constructs of rules (regulative elements) and also informal activities influenced by cultural-cognitive elements such as a 'shared logic of action' that may vary depending on the local context (cf. Table 3.2). Scott [2013] sees great potential in the alignment of the three pillars. However, in most cases, one or another pillar dominates the others, or the pillars may be misaligned. The latter situation refers to trade-offs between the pillars by promoting differing motivations, choices, and behaviours that may give rise to institutional change [Scott, 2013].

Table 3.2: The three pillars of institutions by Scott [2013]: (1) regulative, (2) normative, and (3) cultural-cognitive [Ibid., p.60].

	Regulative	**Normative**	**Cultural-Cognitive**
Basis of compliance	Expedience	Social obligation	Taken-for-grantedness Shared understanding
Basis of order	Regulative rules	Binding expectations	Constitutive schema
Mechanisms	Coercive	Normative	Mimetic
Logic	Instrumentality	Appropriateness	Orthodoxy
Indicators	Rules Laws Sanctions	Certifications Accreditation	Common beliefs Shared logic of action Isomorphism
Affect	Fear, Guilt/Innocence	Shame/Honor	Certainty/Confusion
Basis of legitimacy	Legally sanctioned	Morally governed	Comprehensible Recognisable Culturally supported

Hard Infrastructure & Soft Infrastructure of Institutional Design

Healey [1997] argues for two levels of institutional practices: 'the *soft infrastructure* of practices for developing and maintaining particular strategies in specific places, and the *hard infrastructure* of the rules and resources of policy systems' [Ibid., p.6]. Thus, the *soft infrastructure* involves the institutional practice, and the 'hard infrastructure involves the institutional system. Table 3.3 defines the two terms with regard to Scott's [2013] seven dimensions of institutional characteristics, as listed in Table 3.2. By comparing the characteristics of Table 3.3 with Table 3.2 it becomes evident that *hard infrastructure* as well as *soft infrastructure* include aspects of regulative, normative and cultural-cognitive elements leading to institutional forms where not one 'single element [is] at work but varying combinations of elements' [Scott, 2013, p.70]. In the case of '*hard infrastructure* of the rules and resources of policy systems' [Healey, 1997, p.6], influences of regulative elements have primacy. However, in some situations, normative elements, for instance, may influence these *hard infrastructure* such as a sense of ensuring compliance with social obligations. The notion of *soft infrastructure* encompasses normative as well as cultural-cognitive elements of 'consensus-building and mutual learning' [Healey, 1997, p.200]. Healey [1997] formulates the function and relevance of *hard infrastructure* and *soft infrastructure* as follows:

> '[T]he formal institutions of government have a role in providing a hard infrastructure of a *structure of challenges*, to constrain and modify centres of power, and a soft infrastructure of *relation-building* [...] to develop *social, intellectual and political capital* to promote coordination and the flow of knowledge and competence among the various social relations co-existing within places' [Healey, 1997, p.200].

Here, the term 'formal' refers to, for instance, *formal* institutions of government and *formal* systems and practices of planning in public policy [Healey, 1997]. 'Informal' may describe *informal* cultures and practices or *informal* mechanisms such as community collaboration detached from the *formal* public world [Ibid.]. According to Healey [1997], in some situations also policies may be *informal* as policy intentions are not always 'formally articulated, but rather [...] emerge during the flow of governance activity' [Ibid., p.214]. Furthermore, 'such informal policies would be explicitly acknowledged and converted into [formal] policy statements', from time to time [Ibid.].

Table 3.3: The hard infrastructure and the soft infrastructure defined by Healey [1997] and characerised based on Scott's [2013] seven dimensions of institutional characteristics (cf. Table 3.2).

	Hard Infrastructure	**Soft Infrastructure**
Basis of compliance	Expedience	Social accountability
	Social obligation	Social inclusion
Basis of order	Formal institutions	Formal and informal institutions
	Policy systems	Shared identity
	Planning systems	Local consensus
Mechanisms	Coercive/Empiric	Empiric/Innovative
Logic	Functionality	Implementation
	Efficiency	Adaptation
Indicators	(Legal) Rules	Relation-building
	Rights	Social collaboration
	Duties	Social invention
Affect	Habitualness, Persistence/ Uncertainty	Curiosity/Reluctance
Basis of legitimacy	Social structuring	Inclusionary

Institutional Design of Climate Adaptation Planning

The previously defined notions of *hard infrastructure* and *soft infrastructure* will constitute the basis for the following explanation of climate adaptation planning illuminated from an institutional perspective. According to Sanchez-Rodrigues et al. [2008], there are three distinct dimensions that must be focused, on the side of effective CCA and that are influenced by elements of the *hard and soft infrastructure of planning systems* and planning practices' (cf. Table 3.3): (1) institutional capacity, (2) land use planning, and (3) infrastructure investments. Furthermore, Sanchez-Rodrigues et al. [2008] argue for a 'distinct presence [of these dimensions] depending on whether the discussion is focused on the short-, medium- or long-term [Ibid., p.27]. This may become more evident when referring to their characteristics. Here, institutional capacity is understood as 'building awareness, knowledge, political commitment, better (adaptive) practices and use of resources, the formation of institutions and institutional change' addressing rather long-term discourses on CCA [Sanchez-Rodriguez et al., 2018, p.26]. Land use planning targeting the 'identification and reduction of urban social vulnerability to extreme events related to climate variability and climate change' may be seen as medium-term and infrastructure investments (such as sea barriers, dykes, and relocation of infrastructure) as short-term measures [Ibid.].

Before examining the dimension of 'institutional capacity' more in-depth (see next subsection *Developing Institutional Capacity*) it is useful to have a closer look at the organisation of institutional design and urban planning systems and practices with regard to climate adaptation policy. In this context, discussions about CCA often revolve around issues like location of CCA in local governance, the significance of organisational settings, accountability, participation and ownership [Healey, 1998, Jasanoff, 2010, Griffiths et al., 2007, Sanchez-Rodriguez et al., 2018]. As stated by Jensen et al. [2016], 'participation/community involvement and specific institutional designs may enhance local abilities to manage climate change impacts' [Ibid., p.19]. Referring back to the issue of locating CCA in local governance, the question of institutional design makes it inevitable to address considerations of collaboration across policy

sectors, formal and informal institutions. Cross-sectoral and institutional interactions are often inhibited by 'the lack of formal or informal ways of rooting climate policy' [Jensen et al., 2016, p.19]. Uncovering or introducing existing and new ways of planning practices requires to read the 'local political culture' [Healey, 1997, p.240]. Understanding this local embedding as dynamic in its nature, capable of shifting its structure opens up windows of opportunities for institutional change and re-design.

Developing Institutional Capacity

According to OECD [2006], 'capacity development is understood as the process whereby people, organisations and society as a whole unleash, strengthen, create, adapt and maintain capacity over time' [Ibid., p.12]. In the context of CCA, that means the process whereby society 'unleash, strengthen, create, adapt and maintain capacity' [Ibid.] to give an effective response to climate change and safeguard the city from future climate impacts. A similar definition is set up by Adger et al. [2007] describing this capacity to adapt to climate change as follows:

> 'Adaptive capacity is the ability or potential of a system to respond successfully to climate variability and change, and includes adjustments in both behaviour and in resources and technologies' [Adger et al., 2007, p.727].

Within the development of adaptive capacity, institutional capacity plays a key role [Scavenius and Rayner, 2017, Jensen et al., 2016, Smith et al., 2003]. Successful adaptation requires effective institutional responses that evolve out of their capacity depending on governance systems, institutional design, and organisational settings. In addition, adaptive capacity and, thus, institutional capacity build upon a 'system understanding of capacity resembles approaches drawn from resilience, vulnerability, and sustainability' [Scavenius and Rayner, 2017, p.9]. Taking up these considerations of (adaptive) capacity development and referring back to Jessop's [2001] and Scott's [2013] definitions of institutions lead to the following definition of institutional capacity development:

> 'Institutional capacity development is the process whereby an effective alignment of institutional settings comprising regulative, normative, and cultural-cognitive social practices may unleash, strengthen, create, adapt and maintain capacity such as the ability to respond successfully to climate variability and change' [own elaboration based on Scott, 2013, Jessop, 2001, Adger et al., 2007].

According to Healey [1997], institutional capacity can only develop from *soft infrastructure* that needs to be enabled by 'hard infrastructure of institutional arrangements, legal rules and resource flows' [Ibid., p.209]. This *soft infrastructur*e may entail institutional capacity development by means of 'relation-building through which sufficient consensus-building and mutual learning can occur [...] to promote coordination and the flow of knowledge and competence among the various social relations co-existing within places' [Healey, 1997, p.200]. This implies an interplay of *hard and soft infrastructure* for an institutional design that enables effective capacity development that is, according to FAO and UNDP [2018], characterised by (1) deepened ownership (*soft infrastructure*), (2) technical and functional capacities (*hard infrastructure*), and (3) enhancement of 'capacities interdependently across individual and organisational capacities' (*soft infrastructure*) and 'enabling environment' (*hard infrastructure*). [Ibid., p.8]

Strategy-Making Activities of Climate Change Adaptation

Since strategy-making activities of CCA need to foster adaptive capacity development to 'respond successfully to climate variability and change' [Adger et al., 2007, p.727], institutional

capacity building is a prerequisite. As argued before, this requires an 'enabling environment' of *hard infrastructure* (functionality and operationality of planning systems, rules, resources etc.; cf. Table 3.3) and an 'enhancing environment' of *soft infrastructure* (e.g. planning practices of relation-building, coordination of individual capacities). As argued before, the combined forces of *hard and soft infrastructure* are crucial to building sufficient institutional capacity that fosters adaptive capacity development and enables strategy-making activities of CCA that can give an effective response to climate change.

According to Healey [1997], 'strategy-making activity which "makes a difference"' needs to generate shared convictions, reflect upon existing ideas, promote new ideas, and create social ownership [Ibid., p.268]. In this context, she describes strategy-making as a 'delicate balancing act, between what is and what could be' dependent on the local conditions and needs [Healey, 1997, p.268]. Healey [1997] argues for four questions to review and re-think the *soft infrastructure of strategy-making*: (1) stakeholders and arenas, (2) routines of organising and styles of discussion, (3) making policy discourses, and (4) maintaining consensus. With regard to the scope of this study, the latter one is briefly illuminated in the following. Healey [1997] argues that a 'widely shared and owned' strategy can only express a 'robust consensus' if the 'hard infrastructure of institutional design' maintains agreements without undermining them [Ibid., p.279]. This refers to the formulation but also to the monitoring of the strategy. A clear and shared understanding of issues addressed during strategy-making activities (here, e.g. climate change impacts, impact and vulnerability assessment, climate-adaptive measures) is crucial to building consensus. The dynamics of the city change conditions continuously with regard to, for instance, economic and social processes but also environmental aspects such as uncertainties concerning climate change impacts. As a consequence, 'a spatial strategy should aim to enable those co-existing in shared spaces to evolve their activities flexibly' [Healey, 1997, p.281] to the highes possible extent, which does not compromise the safeguarding of the citizens from climate change impacts.

3.2.4 Conceptual Framework

Figure 3.6 illustrates a schematic overview of the overall conceptual framework. It deduces a consistent theoretical conception by linking the theories and concepts of the previous sections and pointing out their interrelations. Furthermore, the illustration of the conceptual framework reveals an inherent methodology and understanding of the research. In other words, the framework represents the lenses scoping the underlying research problem.

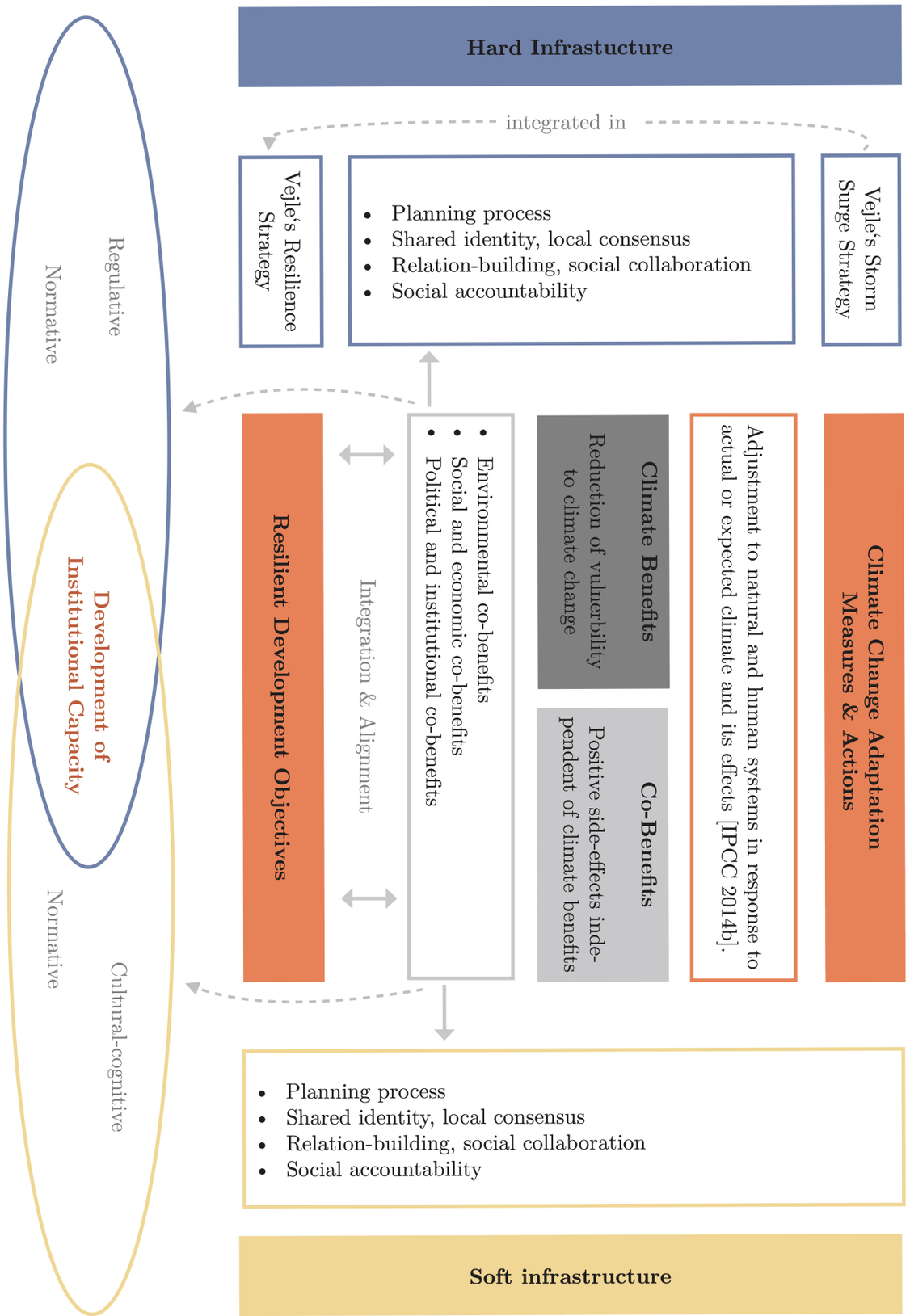

Figure 3.6: Schematic overview of the conceptual framework: Linking co-benefits of climate change adaptation, urban resilience, and institutional theory together.

3.3 Case Study Research

The understanding of case studies varies from case study research as an own research design to a strategy for applying and using various methods or as a method itself [Farthing, 2016]. Regardless, case studies allow an intensive in-depth examination of any 'observational unit' and 'unit of analysis' [Swanborn, 2010, Farthing, 2016, Yin, 1994, Dolma, 210]. (Where the observational unit is characterised by the entity of variables (impact factors) and the unit of analysis is related to the method or way of analysing these variables [Dolma, 210].) These

units encompass the capacity to transfer detailed practical knowledge to the researcher with the potential of interpreting the results in a wider context. The unit of analysis can include decisions and procedures and investigate why they took place, in which context they appeared, and to which results they led [Swanborn, 2010]. This requires a thorough examination of the social context, including the ways in which stakeholders make decisions and cope with problems influenced by social relations and subjectivity such as individual perceptions and behaviours [Ibid.]. By understanding a case study as a holistic research design, Yin [1994] argues for three aspects that need to be taken into account to evaluate the usefulness of a case study: '(1) the type of research question posed, (2) the extent of control an investigator has over actual behavioural events, and (3) the degree of focus on contemporary as opposed to historical events' [Ibid., p.4]. According to Yin [1994], case studies are most useful and preferred if (1) the problem formulation is addressed by 'how' or 'why' questions, (2) the researcher has limited control over an event, and (3) if the focus is on contemporary phenomena within their real-life context.

In the following section, the practicability and usefulness of case study research are further investigated. Section 3.3.1 brings forth an argument for the suitability of case study research in the framework of this study. Sub-section 3.3.2 gives a brief insight into Flyvbjerg's 'Five Misunderstandings About Case Study Research' addressing the 'traditional criticisms of the method' [Yin, 1994, p.1]. In Sub-section 3.3.3, strategies for choosing 'the right' case are illuminated to ensure its suitability for the underlying problem formulation. These two sections represent theoretical considerations on case study research that are used for later argumentation on *Vejle as a case* in the subsequent Chapter 4.

3.3.1 Why Case Study Research?

Before being able to argue for Vejle as a case (Chapter 4), it must be assumed that a case study in itself is the appropriate research design. As stated in the introductory part of this section case studies are most useful and preferred if (1) the problem formulation is addressed by 'how' or 'why' questions, (2) the researcher has limited control over an event, and (3) if the focus is on 'contemporary phenomenon within its real-life context' [Yin, 1994, p.1]. Since these conditions are of rather rough classifications Swanborn [2010] also claims that a case study is a right choice if the focus is on social processes and the interest lies in the 'differences between values, norms, opinions [...], in contrasting visions [...] and the way they [stakeholders involved in the phenomenon] find a solution' [Ibid., p.26]. This argumentation emphasises Yin's [1994] definition of a case study of an inquiry in which 'the boundaries between [contemporary] phenomenon and [real-life] context are not clearly evident' [Ibid., p.13].

Yin's [1994] three conditions that are most useful for conducting a case study are met by the study's problem formulation: (1) the main research question is a 'how' question (see indent below), (2) I have limited control over the ongoing planning processes, and (3) the focus on CCA planning and resilient development represents a contemporary phenomenon within a real-life context. Furthermore, the focus is on social processes within the context of CCA and resilient development, including the involvement of various stakeholders and their values, norms, and opinions. The complexity of the urban phenomena and resilience thinking blurs the boundaries between phenomenon and context (Sections 1.2).

'How' questions can be characterised as interventionist since they are usually concerned with bringing about change, generating practical outcomes, and developing good practice [Blaikie, 2010, Denscombe, 2010]. In this context, the main driving force may be seen as the 'desire to solve a practical problem or to improve procedures' in an iterative process and pragmatist approach [Denscombe, 2010, p.12]. The often dynamic characteristics inherent to 'how' questions

address social processes that are [Yin, 1994, p.7].

3.3.2 Criticisms & Misunderstandings of Case Studies

According to Yin [1994], great care needs to be taken when designing a case study in order to 'overcome traditional criticisms' and ensure the quality of the research [Ibid., p.1]. These criticisms address issues of reliability and validity, where one may differentiate between 'internal validity (can the causal explanations be trusted?)' and 'external validity (degree of generalisability)' [Swanborn, 2010, p.140]. The latter aspect of generalisability or generalisation is often discussed among scholars in the field of case study research [Swanborn, 2010, Flyvbjerg, 2006, Yin, 1994, Gomm et al., 2000].

In his paper 'Five Misunderstandings About Case-Study Research', Flyvbjerg [2006] argues for the use of case study as a method by disproving the following five misunderstood criticisms:

(1) 'General, theoretical (context-independent) knowledge is more valuable than concrete, practical (context-dependent) knowledge.'

(2) 'One cannot generalise on the basis of an individual case; therefore, the case study cannot contribute to scientific development.'

(3) 'The case study is most useful for generating hypotheses;[...] whereas other methods are more suitable for hypotheses testing and theory building.'

(4) 'The case study contains a bias toward verification, that is, a tendency to confirm the researcher's preconceived notions.'

(5) 'It is often difficult to summarise and develop general propositions and theories on the basis of specific case studies.'
[Flyvbjerg, 2006, p.221]

The first Misunderstanding states that context-independent theoretical knowledge is of greater value than context-dependent practical knowledge. Flyvbjerg [2006] disproves this claim by arguing that it has never been possible in social science history to acquire context-independent knowledge. This refers to an underlying scientific approach where knowledge is only acquired through inquiry in a real-life context (cf. Chapter 3.1). Flyvbjerg [2006] claims 'that human behaviour cannot be meaningfully understood as simply the rule-governed acts found at the lowest levels of the learning process and in much theory' [Ibid., p.223].

The second fallacy is one of the most popular ones, as already touched upon at the beginning of this section. It is formulated in the second Misunderstanding as a lack of generalisability 'on the basis of an individual case' [Flyvbjerg, 2006, p.221]. As an implication, individual cases and the conclusions drawn from their investigations 'cannot contribute to scientific development' [Ibid.]. First, this Misunderstanding does not question the implicit usefulness of generalisation in social science. In this context, Gomm et al. [2000] argue that a case study's relevance is not necessarily dependent on its 'external validity' (generalisability) across different cases [Swanborn, 2010, p.140]. According to Flyvbjerg [2006], generalisation should not be regarded as the 'main source of scientific progress' as it does not represent the only way of gaining and accumulating knowledge [Ibid., p.226]. Second, assuming the usefulness of generalisation as inherent to the second Misunderstanding, Flyvbjerg [2006] claims that one can generalise from a single case if thoroughly chosen (cf. Sub-section 3.3.3). He further argues that a range of fundamental scientific discoveries such as 'Galileo's rejection of Aristotle's law of gravity' were generalised from a single case. According to Norreklit et al. [2016], the practice orientation of a case may allow its study concerning activities and processes and their 'repetitive realisation

of underlying generalisations' [Ibid., p.297]. In other words, case study research can contribute to scientific development in the sense that they provide information on the applicability of (theoretical) generalisation underlay in a practice context.

The third Misunderstanding derives directly from the previous one by claiming that 'the case study is most useful for generating hypotheses; [...] whereas other methods are more suitable for hypotheses testing and theory building' [Flyvbjerg, 2006, p.221]. As argued above, case studies may be useful for generating hypothesis in case of their generalisability. Furthermore, they may represent a unit of analysis for testing the applicability of (theoretical) generalisations [Norreklit et al., 2016]. Flyvbjerg [2006] emphasises that 'case study is useful for both generating and testing of hypotheses but is not limited to these research activities alone' [Ibid., p.229]. Despite this, a strategic and reasonable selection of the case is imperative for the quality of research output and the potential of the case study to contribute to scientific development.

The fourth Misunderstanding addresses the criticism that a subjective bias towards verification is inherent to case studies. According to Flyvbjerg [2006], this criticism applies to all research methods since the researcher's preconceived notions do not depend on the type of research method. Moreover, the bias towards verification lies more in the underlying theory influencing the researcher's expectations rather than in the case study itself. As a consequence, researchers often adjust their choice of theory with regard to their subjective notions of what they expect from the outcome of the case study. This, in turn, may lead to the falsification of the overall case study design [Flyvbjerg, 2006].

Last but not least, the fifth Misunderstanding addresses the difficulty of summarising specific case studies and developing general theories. According to [Flyvbjerg, 2006], the difficulty of summarisation is not inherent to the case study as a method itself but rather relates to the studied reality. This refers once more to the underlying understanding of the social world as subject to human behaviour, actions, and consequences influenced by subjectivity (cf. Chapter 3.1) and the implications drawn from by the researcher. Furthermore, Flyvbjerg [2006] argues that as for generalisation also summarisation of case studies is not prerequisite since their significance often exists in their narrative entirety.

3.3.3 Theoretical Considerations for Choosing Cases

As touched upon in the previous sub-section, a thorough selection of the case is imperative in order to ensure the utility of the case study research with regard to the type of information that is intended to be obtained. The type of information or purpose depends on the type of the selected case. Flyvbjerg [2006] argues for four different types of selections (1) extreme/deviant cases, (2) maximum variation cases, (3) critical cases, and (4) paradigmatic cases. The three types that are applicable to single case studies and, thus, relevant to illuminate in the context of this study, are listed in Table 3.4. In addition, the table is supplemented by a fourth type of single case study, the 'revelatory cases' as established by Yin [1994]. While the first type 'extreme/deviant cases' reveals information on unusual cases with problematic or outstanding conditions, 'critical cases' allow a logical deduction in the sense that 'if this is (not) valid for this case, then it applies to all (no) cases' [Flyvbjerg, 2006, p.230]. The third selection of 'paradigmatic cases' provides the opportunity of establishing a school in their domain of concern [Ibid.]. This is not to be understood as the development of a general theory but rather as the expression of a scientific paradigm, a 'practical prototype[] of good scientific work' [Flyvbjerg, 2006, p.232]. Last but not least, 'revelatory cases' are related to 'paradigmatic cases' in the sense that they may also reveal the opportunity for the formulation of a scientific paradigm. However, Yin [1994] does not necessarily see the establishment of a paradigm as an imperative for the 'revelatory case', but solely emphasises the 'opportunity to observe and

analyse a phenomenon previously inaccessible to scientific investigation' [Ibid., p.40].

Table 3.4: Strategies for the information-oriented selection of cases applicable to single case studies [Flyvbjerg, 2006, Yin, 1994].

Type of Selection	**Purpose**
(1) Extreme/deviant cases	To obtain information on unusual cases, which can be especially problematic or especially good in a more closely defined sense.
(2) Critical cases	To achieve information that permits logical deductions of the type, "If this is (not) valid for this case, then it applies to all (no) cases."
(3) Paradigmatic cases	To develop a metaphor or establish a school for the domain that the case concerns.
(4) Revelatory cases	To uncover some prevalent phenomenon previously inaccessible to scientists.

However, the previously given information does not answer the following questions: (1) *How does one identify the appropriate type of case for their research design?* and (2) *How does one find the identified type of case in a real-life context?*. Yin [1994] states that the selection of an appropriate case is related to the way the problem formulation is defined. An accurately formulated research question may help to identify the most appropriate type of case. The second question of 'how to find the identified type of case in a real-life context' seems to be more difficult to answer. According to Flyvbjerg [2006], there is no universal set of principles or indicators that identify a case as a certain type. With regard to the identification of a critical case Flyvbjerg [2006] suggests looking for cases 'likely to either clearly confirm or irrefutably falsify propositions and hypotheses' [Ibid., p.231]. Identifying a paradigmatic case may be much more challenging since it is not characterised by any 'sort of rule-based criteria' as it sets the standard by itself [Ibid.]. In the end, it remains to be mentioned that the different types of selections are not mutually exclusives and that a case can be an extreme, critical, and paradigmatic case at the same time. Such a case may illuminate various different perspectives and multiple conclusions depending on its interpretation as one ore another type of case [Flyvbjerg, 2006].

Chapter 4

Vejle as a Case

This chapter brings forth an argument for *Vejle as a case*. It takes its point of departure in background information on the local context of Vejle (Section 4.1) outlining (1) local climate change impacts, (2) local plans and strategies of climate adaptation, and (3) local governance of planning structures. Section 4.2 highlights Vejle's Storm Surge Strategy and its Resilience Strategy and points out their significance and interrelation. Eventually, in Section 3.3.1, reasonable answer to the question of *Why Vejle as a Case?* and an argumentation for the focus on Vejle's Storm Surge Strategy is given. Section 4.4 takes up this argumentation by referring to the main *Research Question* stated in Chapter 2 and formulating three contextualised *Sub-questions* for the analyses in Part III.

4.1 The Local Context of Vejle

This section provides an insight into the local context of the city of Vejle. The following subsections illuminate the city of Vejle with regard to local climate change impacts, current and future climate challenges, local climate adaptation, and resilience strategies as well as local governance structures in the context of CCA.

Vejle Municipality (Vejle Kommune) is part of the Southern Denmark Region located in the southeast of the Jutland Peninsula and its population size accounts for 111,000 inhabitants. About half of the citizens live in the city of Vejle itself, which is to be found in the east of the municipality at the head of the Vejle Fjord. Figure 4.1 maps in detail the elevation of Vejle focused on the city centre and the harbourfront. The map shows Vejle located in a valley flanked by hills to the south and north of the city. A closer look at Figure 4.1 gives a hint of several streams converging at the city centre. The river Grejs Å flows from the north into the city centre emptying in the river Vejle Å running from the east to the west and emptying in the Fjord. (In the following, Vejle refers to the city and not to the name of the municipality, unless otherwise stated.) [Vejle Kommune et al., 2016]

Figure 4.1: Elevation of the city of Vejle, Denmark. [SCALGO, 2020].

Vejle's geographic location and vicinity to water are acknowledged as part of its history and identity that creates opportunities to use nature to create an attractive city' [Vejle Kommune et al., 2016, p.17]. Its economy is characterised by industry and manufacturing with a growing share of creative businesses and IT companies [Ibid.]. Vejle is known for visionary construction projects such as the residential building complex 'The Wave' (Bølgen) at the harbour front or the fortress-like iconic Fjordenhus designed by world-renowned artist Olafur Eliasson located in the harbour basin itself (see Figures 4.2 and 4.3). Vejle has coined the term sustainable growth as central to its visions, is at the forefront of smart-city solutions, and is to implement innovation as a cross-administrative strategy as one of Denmark's first cities [Vejle Kommune et al., 2016, Resilience Lab Denmark, 2020, Green Tech Center, 2020, Nordic Smart City Network, 2020].

Figure 4.2: Fjordenhus at Vejle's located in Vejle's harbour basin [Visit Vejle, 2020b].

Figure 4.3: The Wave (Bølgen) located at Vejle's harbour front [Visit Vejle, 2020a].

Despite a long-term history of socio-economic stability, Vejle has been facing several social, environmental, and economic challenges in recent years. One of the main challenges is the increased risk of flooding exacerbated by climate change and entailing physical, social and economic consequences. Urbanisation and infrastructure demand put additional pressure on the city's development, impacting the quality of life of its citizens. Changing industries, the global economy, and rapid technology requires the local job market to adapt in order to ensure stable

employment conditions. Last but not least, demographic changes challenge community cohesion putting inclusive urban transitions high on the agenda. [URBACT, 2020, Vejle Kommune et al., 2016]

Local Climate Impacts & Challenges

Vejle's geographic location and changing climate cause major challenges related to an increased risk of flooding of the two streams of Vejle Å and Grejs Å as well as of Vejle Fjord or a combination thereof [Vejle Kommune, 2014, Kystdirektoratet, 2011]. The increasing risk of flooding is based on climate predictions and historical records showing evidence for an increase in the frequency of rain events, cloudbursts, and storm surges over the last decades and in future times [Vejle Kommune, 2017]. More precisely, scenarios predict an increase of annual precipitation and cloudbursts up to +11% and +20% by 2050 [Ibid.]. In addition, the expected sea-level rise of +0.8 meters by 2100 represents an additional threat increasing the risk of flooding by the Fjord. As the water system of the Fjord, rivers, and drainage systems are interconnected, their water levels are mutually dependent and, thus, also affect the groundwater. In the long-term, rising sea-level will synchronously lead to an increase in the groundwater level. Figure 4.4 illustrates these water dynamics where in cases of high water levels in the Fjord or storm surges, the water pushes into Vejle Å, causing the deceleration of the river water that, in turn, gets stowed. If the pressure of the Fjord is high, a lot of water is accumulated and may overflow the river bank causing flooding of the surrounding areas. The river Grejs Å directs the water upland down to the city centre into the river Vejle Å. In particular, in cases of heavy rain events, the water flow of Grejs Å represents additional pressure to the water system and increases the risk of flooding [Vejle Kommune, 2020b].

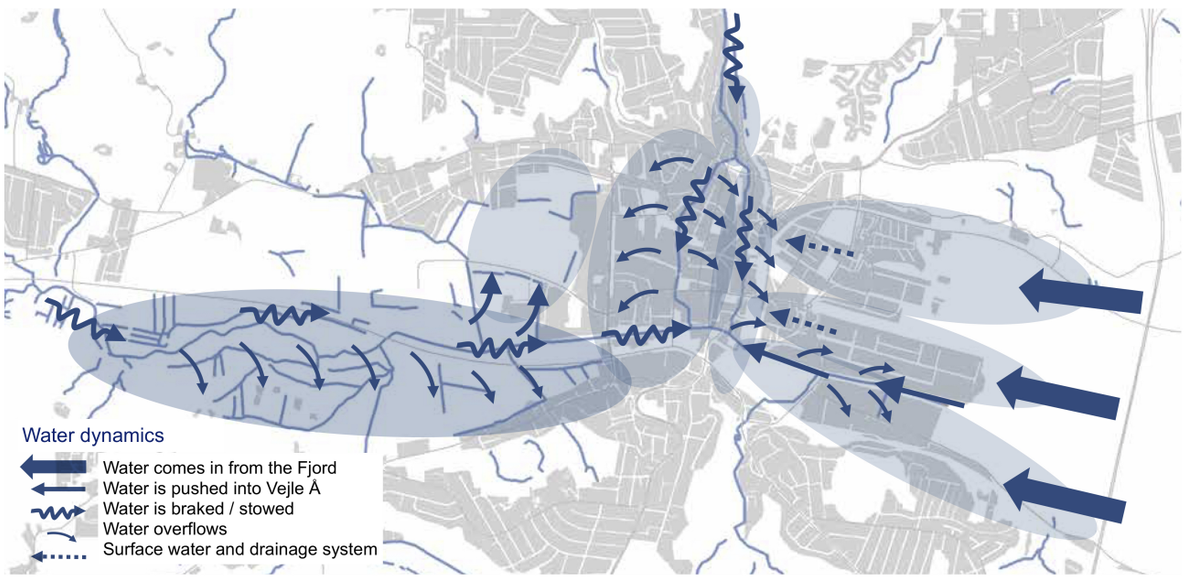

Figure 4.4: Water dynamics of Vejle Fjord and the river systems composed of Vejle Å and Grejs Å [Vejle Kommune, 2020b, p.20]

In 2011, the EU Floods Directive got integrated into the Danish legislation leading to the designation of 10 Danish risk areas based on a preliminary flood risk assessment [Jebens et al., 2016]. The City of Vejle was appointed as one of them and has remained designated after a reassessment in 2018. Figure 4.5 shows the demarcation of Vejle as a risk area covering the harbour area (Fjordbyen), the city centre (Midtbyen), and parts of the western district (Vestbyen) following the river course of Vejle Å to the city outskirts.

The assignment was carried out by the Danish Coastal Authority (Kystdirektoratet), taking eight historic storm surge events since 1872 into account and using 2060 as a year of reference. In addition, the projections and climate scenarios considered a medium-term sea level rise

of 30 centimeters involving an uncertainty assigned to climate projections and time frame. With these assumptions, risk areas became assigned if existing storm surge protections (dykes, dunes, seawalls, etc.) could not withstand, and the applied scenarios were causing flooding areas. According to the Danish approach, these areas must contain a minimum of real estate value of properties that potentially getting flooded. For 950 properties being located in the risk area, this value had been estimated at 8.7 billion DKK for a 100-year flood event (status as of April 2011 [Kystdirektoratet, 2011, p.94], new calculations will be executed by the Danish Coastal Authority at the beginning of 2020).

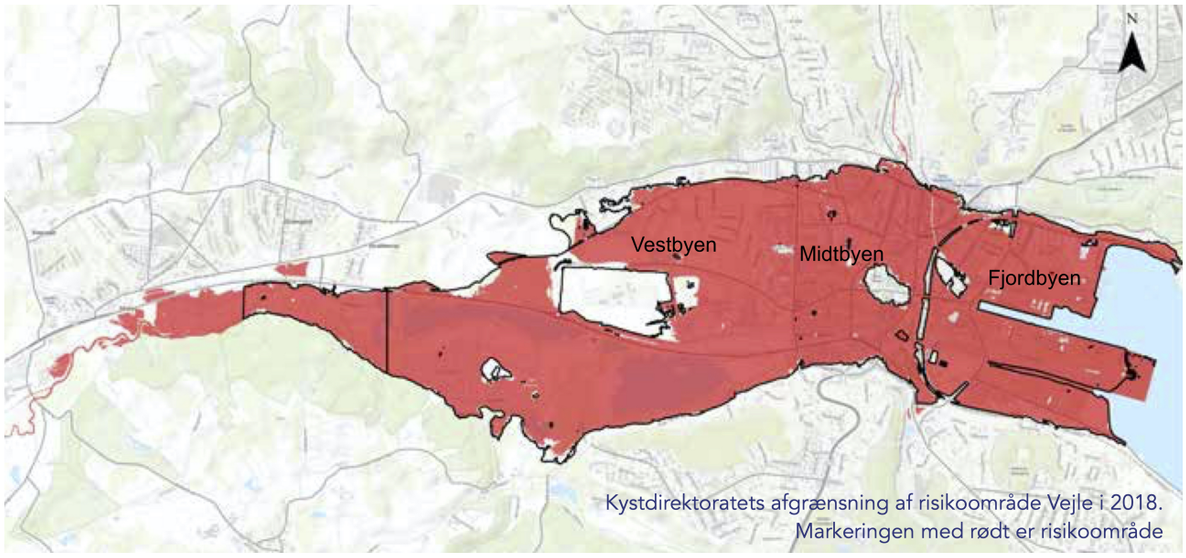

Figure 4.5: Danish Coastal Authority's delimitation of Vejle as a risk area (marked in red), 2018 [Vejle Kommune, 2020b, p.19].

Local Plans and Strategies of Climate Adaptation

The designation of risk areas only represented the first step of the implementation of the EU Floods Directive. In a second step, the hazard, vulnerability, and risk assessment aimed at resulting in a third step, the creation of Flood Risk Management Plans for the designated risk areas [European Commission, 2007]. In 2015, Vejle adopted its Flood Risk Management Plan addressing four main sectors of risk reduction including civil society, environment, cultural heritage and economic activities targeted by a general emphasis on three main objectives: (1) prevention, (2) preparedness, and (3) restoration [Vejle Kommune, 2015]. Prevention aims at addressing future climate-proof urban development taking climate change impacts and risks into consideration in prior planning and design processes. In this context, the Vejle's Flood Risk Management Plan puts emphasis on sustainable and resilient solutions that provide added value to the city and involve cities, businesses and other stakeholders [Vejle Kommune, 2015, p.22]. Preparedness implies the provision of sufficient safeguard and security in emergency cases and needs to build upon a better understanding of interactions and processes between the rivers, the Fjord, and climate impacts [Ibid.]. Expanding the knowledge on hydraulic conditions and climate adaptation benefits not only an accurate preparedness but opens up opportunities for preventive actions that reduce the risk of flooding.

These actions of prevention and adaptation to future risks of flooding and climate change impacts are pointed out in the Climate Adaptation Plan (Klimatilpasning for Vejle Kommune) that adopted by Vejle Municipality in 2014, only a few months prior to the release of the Flood Risk Management Plan. The Climate Adaptation Plan builds upon four main visions addressing (1) the opportunity of CCA actions to create development and growth, (2) the strengthening of Vejle's identity by making water more visible, (3) the creation of a Climate Adaptation Plan

that incorporates social, environmental and economic considerations, and last but not least, (4) the consistency and integration of the Climate Adaptation Plan with other municipal plans [Vejle Kommune, 2014]. The latter two goals are based on a strong emphasis on co-creation and dialogue involving citizens, businesses, and research in order to ensure 'sustainable climate adaptation, which means [...] a holistic approach' [Ibid., p.50]. An introduction of Vejle's Resilience Strategy (2016) and its Storm Surge Strategy launched at the beginning of 2020 is given in the following Section 4.2.

Local Governance of Planning

Denmark is divided into five regions (regioner) being composed of 98 municipalities (kommuner) one of which is Vejle Municipality. Only the municipalities are considered local authorities, and the responsibility for the entire local organisation lies with the local council, which is elected with a four-year period. Several committees (including a compulsory Finance Committee) are vested in preparation and implementation of the council's decisions. The aforementioned organisational structure is required by the Local Government Act. However, the local council subjects a certain degree of administrative freedom to align local circumstances with a suitable kind of management structure. This degree of freedom is not always laid down in law but is supposed to be influenced by unwritten municipal authority rules (principles). In general, these principles are based on the premise to benefit the local citizens and to consider their concerns related to, for instance, recreational, cultural, and sports activities. [Danish Ministry of Social Affairs and the Interior, 2020]

The municipal authority principles need to inform the guidelines for local plans such as local authority plans and local development plans. Furthermore, these local guidelines are subject to overall planning guidelines and visions set by the state. The content of any development plan at municipal level is guided by a framework for local planning elaborated by the local authority. This framework intends to ensure 'a cohesive urban structure and the [implementation] of the local authorities' overall objectives [Danish Ministry of the Environment, 2012, p.20].

While a local authority plan provides a comprehensive overview of overarching strategies and visions for the entire municipality, local plans substantiate strategies for the development of smaller areas. For instance, Vejle's Climate Adaptation Plan as part of its Municipal Plan (Kommuneplan Vejle 2013-225) is an example of a local authority plan. (In the context of the national 'Action Plan for a climate-proof Denmark' (2012), all municipalities were obligated to prepare and adopt local climate adaptation plans by the end of 2013 [Danish Government, 2012].) Whereas Vejle's Storm Surge Strategy for a resilient Fjordbyen represents a best example of a local plan substantiating the development of a specific and smaller area within the municipality. [Danish Ministry of the Environment, 2012]

4.2 Resilience Strategy & Storm Surge Strategy

With regard to the city of Vejle, urban planning processes may be seen as embedded in the pursuit of resilient development. Vejle's Storm Surge Strategy is based on its Resilience Strategy that is carried out under the guidance of the 100RC Framework (Sub-section 3.2.2). In the following, the concept of adaptation co-benefits is understood in the context of urban resilience as a paradigm (referred to the understanding of urban resilience as presented in Section 3.2.2). Taking these conditions as predetermined requires a problem analysis with regard to multiple aspects: (1) the current state and practice of co-benefit concepts, (2) their conceptualising with regard to urban resilience, and (3) co-benefits and resilience concepts in urban governance and planning. The subsequent paragraph provides a reflection upon these aspects by examining the

current state of knowledge with regard to co-benefit concepts in CCA. This represents a general analysis of problems with regard to co-benefits, urban resilience, and their interrelation. The following analysis aims to point out the current state of knowledge and represents the pathway resulting in the formulation of the problem in the form of a research question and, in the later course of argumentation, three underlying sub-questions (Section 4.4).

Resilience Strategy

Based on the idea of a holistic approach Vejle Municipality launched Europa's first Resilience Strategy in 2016 after being selected to join the 100RC global network in 2013. Vejle's Resilience Strategy is based on the following four strategic pillars: (1) a co-creating city, (2) a climate-resilient city, (3) a socially resilient city, and (4) a smart city. These pillars can be regarded as integrated, and actions ought to address cross-cutting challenges emphasising a holistic and dynamic approach that is required to ensure urban resilience. Multi-sectoral and multi-disciplinary collaboration is an essential prerequisite in order to implement actions that entail resilient synergies and multiple benefits. Resilience may create a value of stability, increasing welfare conditions and business development opportunities by strengthening collaboration and knowledge sharing among different actors. As a result, challenges related to flood risk and climate change are targeted with actions that include social, environmental, and economic considerations. One such action is 'Fjordbyen as a laboratory for climate change adaptation and flood control' focusing on the harbour front (see Figure 4.5) being at the highest risk for flooding during storm surges [Vejle Kommune et al., 2016, p.30]. It takes up Vejle's vision of turning the water into an asset that creates added value for Fjordbyen's residents and visitors. The main objective is to 'improve living with, and alongside water, to promote economic growth whilst simultaneously reducing flood risk' [Ibid.]. 'Fjordbyen' is one out of 15 priority actions pointed out in Vejle's Resilience Strategy. Though this action is underpinned by the strategic pillar of 'a climate-resilient city', it needs to address the three other pillars to an equal extent in order to contribute to overall urban resilience. [Vejle Kommune et al., 2016]

Storm Surge Strategy

A proposal of the Storm Surge Strategy (Stormflodsstrategi) published in February 2020 presents a detailed guideline for a resilient Fjordbyen starting from the four strategic pillars of the Resilience Strategy with a vision of 'storm surge protection [adaptation] that grows with the city'. The focus area Fjordbyen of the Storm Surge Strategy is designated as one of 15 priority actions in Vejle's Resilience Strategy [Vejle Kommune et al., 2016]. The public consultation period taking place from February to September 2020 will be followed up by the development of a solution catalogue for three phases of action. (The concrete efforts will be included in the upcoming revision of the Flood Risk Management Plan, which should be adopted by autumn 2021.) Based on scenarios for 100-year storm surge events, these three phases address solutions for safeguarding Fjordbyen up to a water level of 2, 2.5 and 3 meters by 2025, 2050 and 2070, respectively. The strategy is based on three criteria (1) ensuring that the adaptation measures strengthen Vejle's identity as a city at the fjord, (2) protecting the city by turning water into an asset for urban and social capital, and (3) implementing adaptation measures that follow three basic principles (added value, continuous line of protection, positive meeting with water). [Vejle Kommune, 2020b]

4.3 Why Vejle as a Case?

Why Vejle as a case? According to Yin [1994], 'the definition of [...] the case is related to the way the initial research questions have been defined' [Ibid., p.22]. Hence, the following description of Vejle as a case takes its point of departure in the primary *Research Question* formulated as follows:

> *Why do co-benefits of coastal adaptation matter and how can they contribute to the resilience of coastal communities*

Vejle as a case promises to allow insights into actions, situations, and consequences related to the study's focus of adaptive and resilient planning in coastal areas. Its various endeavours for climate-proof and resilient urban development and the interplay of both seem to be outstanding. By establishing Europa's first Resilience Strategy, a local Climate Adaptation Plan, a Flood Risk Management Plan, and a Storm Surge Strategy (among various other climate-adaptive projects) Vejle Municipality is a pioneer in taking action for safeguarding its citizens from climate change impacts (Section 4.1). Yet, it is crucial to acknowledge that the interplay of cities' geographical location and local climate change impacts make the city particularly vulnerable. As aforementioned, Vejle has been designated to one of 10 flood risk areas in Denmark [Jebens et al., 2016]. This also highlights the high climate risks to which the city is exposed. Thus, the city's actions were imperative to a certain degree. However, throughout Denmark, the urban planning practices of CCA in Vejle are unique in the sense of pursuing an integrated approach of co-benefit (added value) driven coastal adaptation and resilient development [cf. Tiselius, 2020, Olsen, 2020, Fryd, 2020].[1]

Vejle may be regarded as an 'embedded case' by referring to Yin's [1994] definitions of an 'embedded, single-case design' where the single case involves more than one unit of analysis. As explained in Section 3.3, a unit of analysis represents the scope within the investigation of decisions and procedures of a real-life phenomenon that takes place [Swanborn, 2010]. Thus, it represents the demarcation for the collection and analysis of the data [Yin, 1994]. According to Yin [1994], the main unit of analysis encompasses all sub-units and delineates the processes, actions, decisions, etc. that need to be investigated in order to answer the primary Research Question. Yet, a delineation of units of analyses can only be a rough categorisation that may intersect and overlap in its interests and variables [Harrison et al., 2017]. These variables may be institutions, stakeholders, and individuals. In principle, each sub-unit can be broken down in smaller and smaller sub-units. However, there is a risk of giving the sub-units too much attention and of losing the bigger picture of the holistic aspects of the main unit of analysis [Yin, 1994]. That may not only result in difficulties to draw conclusions addressing the primary research question but may also shift the case study's orientation and change its overall nature [Ibid.].

Figure 4.6 illustrates the city of Vejle as the main unit of analysis embedded in governance and urban planning processes that inform the planning and implementation processes of the 'hard infrastructure' (sub-unit II) in the form of Vejle's Storm Surge Strategy and Vejle's Resilience Strategy. Where 'hard infrastructure' is termed as formal organisational structures by Healey [1997]. On the contrary, a sub-unit II may be defined as 'soft infrastructure' defined by social relations and worlds, informal networks and arenas, organisational routines [Healey, 1997] (see Sub-section 3.2.3). In the case of Vejle, the 'soft infrastructure is composed of Vejle Kommune, the 100RC network, and the citizens of Vejle, among many other actors. (Healey [1997]

[1] Here, the citation of interviewees adheres to the general citation style of this study by giving the last name of the cited interviewee and the year in square brackets. The transcribed results of all interviews can be found in Appendices D to H. (Note that citations do not appear in the preceding list of references.)

claims that in order to consider the development of interactive practices such as urban planning processes, the focus needs to be on both *hard infrastructure* and *soft infrastructure* [Ibid.].)

Vejle as an extreme case? By referring back to the different types of case selection and their purposes (Table 3.4), the reference to Vejle as a case becomes more clear. As derived from the previous paragraphs, Vejle's actions on coastal adaptation in the framework of its Storm Surge Strategy and integrated into resilient development are outstanding. It may, thus, be argued for *Vejle as an extreme* promising to reveal information on a case that is 'especially good in a more closely defined sense' [Flyvbjerg, 2006, p.230]. Yet, even though there is evidence on an implemented Resilience Strategy, the Storm Surge Strategy is currently only a proposal that still lacks implementation. Thus, Vejle's outstanding good practices has not yet been proven with regard to the study focus. Since the aim is to gain the 'opportunity to observe and analyse a phenomenon previously inaccessible to scientific investigation' (in the context of Denmark), Vejle as a case may rather be seen as 'revelatory case' [Yin, 1994, p.40]. The aim is not to develop a rigid 'school in the domain that the case concerns' in the sense of a paradigmatic case [Flyvbjerg, 2006, p.230] but rather to investigate characteristics of good practice from a pragmatic perspective. This perspective takes context-dependency of actions, situations, and consequences into account without neglecting transferability [cf. Guba, 1990]. The ongoing development process of Vejle's Storm Surge Strategy in relation to its established Resilience Strategy opens up opportunities for investigating urban planning processes concerning the posed Research Question.

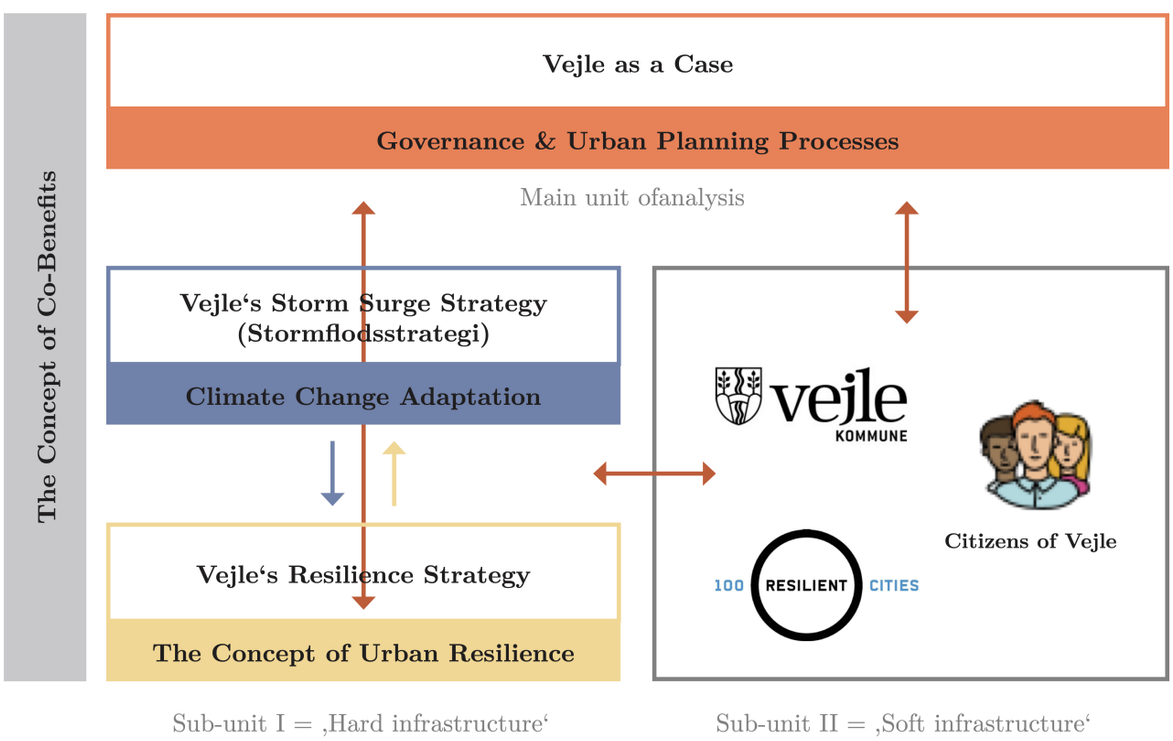

Figure 4.6: An embedded, single-case design of Vejle City (main unit of analysis) including Vejle's Storm Surge Strategy and Vejle's Resilience Strategy as 'hard infrastructure' (sub-unit I) and 'soft infrastructure' (sub-unit II) [logos by Vejle Kommune et al., 2016, 100RC, 2019].

4.4 Problem Formulation

As aforementioned, Vejle's Storm Surge Strategy is based on its Resilience Strategy and can be seen as the endeavour of contributing to Vejle's resilient development. Taking up the challenges as identified in Chapter 2 and putting them into the context of Vejle's Storm Surge Strategy as a case results in the following two questions: (1) What is the relevance of climate co-benefits in the

process of the Storm Surge Strategy, and how can they contribute to Vejle's pursuit of a resilient urban development? and (2) What are the potentials and challenges of incorporating co-benefits approaches into the planning process of Vejle's Storm Surge Strategy? The latter question does not only refer to explicitly formulated co-benefits in the framework of the written report of the Storm Surge Strategy, but its analysis ought to go beyond determining characteristics and indicators of co-benefits. In other words, what kind of added value can co-benefit approaches deliver with regard to the governance of urban planning processes?

It can be concluded that there are still ambiguities concerning the significance and impact of climate co-benefits, in particular, concerning their integration into governance and urban planning processes. However, Vejle's Storm Surge Strategy theoretical considerations seem to open up opportunities for integrating co-benefits of climate adaptation into urban planning processes in order to deliver added value for a 'resilient Fjordbyen' [Vejle Kommune, 2020b]. Thus, Vejle has been pointed out as a suitable case for the following *Research Question* (followed by three sub-questions):

> *Why do co-benefits of coastal adaptation matter and how can they contribute to the resilience of coastal communities*

A priori to the strategy's formulation in 2019, citizens of Vejle were invited to take a stand and to come up with ideas for what they connect with added value when talking about a future climate-resilient city [Vejle Kommune, 2020b, p.24]. Vejle Kommune [2020b] states that protecting the city from flooding needs to go hand in hand with creating 'good urban space'. This process opens up opportunities 'to co-create the city between public and private actors, creating added value while ensuring the future climate-resilient development of the city [Vejle Kommune, 2020b, p.84]. Understanding the local perception of CCA and liveability is part of understanding the local context that is crucial for examining governance structures and questions of resilience. This leads to *Sub-question I* formulated as follows:

I What is the local perception of climate change adaptation and liveability in Vejle?

As mentioned before, 'added value' is central in Vejle's Resilience Strategy. Added value as an aspect that may be found in the characteristics of co-benefits itself and a potential for planning processes that go parallel with co-benefit approaches. Added value is a term that may give rise to ambiguities. What may be of added value for one stakeholder might not be for another. According to [Healey, 1998], the perspective and opinion of different stakeholders are influenced by 'differential access to empirical facts' and that, in turn, impacts their values, reasoning and styles of argumentation [Healey, 1998, p.1540]. In this context and with regard to the theoretical *framework for co-benefits of climate change adaptation* (Sub-section 3.2.1) *Sub-question II* seeks to examine the conceptualisation of co-benefits as formulated in Vejle's Storm Surge Strategy and its Resilience Strategy. The sub-question is divided into two subordinate questions of which *II.a)* co-benefits of climate change adaptation measures in Vejle's Storm Surge Strategy, and *II.b)* investigates the role of co-benefits in Vejle's Resilience Strategy.

II How are co-benefits of climate change adaptation measures conceptualised, in the local context of Vejle?

II.a) How are co-benefits of climate change adaptation measures being addressed in Vejle's Storm Surge Strategy?

II.b) What role do co-benefits of climate change adaptation play in Vejle's Resilience Strategy?

Resilience thinking needs to deal with a great deal of complexity influenced by a dynamic interplay between social and ecological processes (cf. Section 3.2.2). [Duit et al., 2010] argues that responsive governance processes benefit from 'emerging forms of public steering such as network governance, public-private partnerships, self-organisation, and stakeholder involvement' and are 'better able to deal with increasing external complexity' [Duit et al., 2010, p.336]. In this context, the question that arises is the extent to which co-benefits concepts may facilitate or impede these governance processes and how they may become integrated into decision-making on urban issues. This perspective addresses an 'added value' nature of the delivered co-benefits that moves beyond their characteristics (such as, e.g. increased health benefits) but illuminates their potential of contributing to resilient urban development. *Sub-question III* examines the potentials and challenges of integrating CCA co-benefits into the planning process of Vejle's Storm Surge Strategy:

III What are the potentials and challenges of integrating co-benefits of climate change adaptation into the planning process of Vejle's Storm Surge Strategy?.

Chapter 5

Methods

This section describes the methods selected with regard to methodological considerations spanning from ontological and epistemological rationales (Section 3.1) to considerations on case study design (Section 3.3). The purpose of qualitative methods involved in the research process may best be defined with Farthing's [2016] words:

> ...'to adopt methods of research which are seen as allowing those involved in a situation to describe the nature of their experience of that situation in their own words, and to emphasise the multiplicity of perspectives on any situation including the nature of the problem' [Farthing, 2016, p.124].

Despite the argument that quantitative and qualitative methods are subject to separate scientific paradigms, and this context argued as mutually exclusive, the interest in mixed methods research has grown since the 1950s [Bryman, 2012]. One reason is that more and more scholars have disproved the incommensurability of different paradigms and have pointed out overlaps and commonalities between them. Another reason addresses methods as detached from fixed ontological and epistemological implications. Creswell [2014] argues that mixed-method research provides 'a more complete understanding of changes' and 'a better understanding [of] the need for and impact of an intervention' [Creswell, 2014, p.217]. Furthermore, he [1994] claims that there exists 'a false dichotomy [...] between qualitative and quantitative approaches and that researchers should make the most efficient use of both [approaches] in understanding social phenomena' [Creswell, 1994, p.176].

The following section gives a brief overview of literature review as a method followed by an explanation of document analyses in the subsequent section. The document analysis is put into the study's context with regard to Analysis II. Section 5.3 describes the quantitative method of survey conducting. The type of interview conducted in the framework of this research, its design and methodological considerations are described and analysed in Section 5.4.

5.1 Literature Review

This section provides a brief overview of literature review and its significance in the framework of this study. Here, 'literature' is defined as various sources of written works such as journal articles, newspaper articles, and books. The form may be either analogue or digital, like, for instance, paper print outs or e-books. Literature review is usually a point of departure of every research process to either accumulate knowledge in the field of study or to 'develop[] an argument about [its] significance' [Bryman, 2012, p.98]. In this respect, it is not sufficient to reproduce other scholar's and author's theories and opinions; rather, it is necessary to interpret and reflect them in order to draw new conclusions. Bryman [2012] differentiates between 'narrative review' and 'systematic review' where the first describes 'a more uncertain process of discovery', and

the latter one refers to an approach of adopting 'explicit procedures' [Bryman, 2012, p.110]. According to Tranfield et al. [2003], systematic literature reviews benefits from counteracting and minimising the bias of the researcher 'by adopting a replicable, scientific and transparent [review] process' [Ibid., p.209]. Bryman [2012] argues for the following four steps compromised by accounts of systematic review processes:

(1) Define the purpose and scope of the review;

(2) Seek out studies relevant to the scope and purpose of the review;

(3) Appraise the studies from step (2);

(4) Analyse each study and synthesise the results [Bryman, 2012, p.105].

Both approaches were applied to a greater or lesser extent, in the course of this study's research process. A narrative review was essential to gain a comprehensive overview of the concept of co-benefits, resilient development, climate-adaptive planning, and their interrelations. Here, the main purpose lay in understanding the subject's notions, illuminating their different interpretations, and getting an idea of their relevance as well as significance in research and practice. This procedure meant to open up a critical analysis of research/practice gaps enriching the discourse on the research topic and leading to the formulation of the underlying problem analysis of this study (Section 2).

A more systematic review was conducted to get an insight into the local context of the case (Section 4.1). The main objective was to gather information on the main unit of analysis Vejle City and to point out potential sub-units with respect to the problem formulation (cf. Figure 4.6). Furthermore, a thorough literature review in a systematic manner was carried out for setting up the theoretical framework by conceptualising the different theories (Section 3.2). In both cases, the review process followed the four steps of Bryman's [2012] suggestion for a systematic review where the first step was informed by the research questions. However, more detailed guidance in the form of, for instance, a thorough protocol that would have allowed for 'an audit trail of the [my] decisions, procedures and conclusions' was not applied [Tranfield et al., 2003, p.209].

5.2 Document Analysis

Referring to the aforestated definition of 'literature as various sources of written works' documents may also be regarded as one of them. Yet, the method of document analysis differs from literature review in that respect that it primarily focuses on the analysis of policy documents such as development plans, national strategies, and legal papers. In general, policy documents are released and adopted by the public sector at different levels of governance and under different separations of power. According to [Farthing, 2016], policy documents and development plans are a key part of the 'hard infrastructure' termed by Healey [1997] as formal organisational structures (see Sub-section 3.2.3).

According to Bowen [2009], documents can serve a variety of purposes. He points out 'five specific functions of documentary material':

(1) Documents provide data on the political, social, and historical context of a certain subject, institution or case;

(2) Information contained in documents may raise 'questions that need to be asked and situations that need to be observed' (that may be investigated by complementary methods);

(3) Data obtained by document analysis provide supplementary information that creates additional value to a knowledge base;

(4) Documents are means for tracking change and development by examining documents such as various different drafts or periodic reports;

(5) Document analysis opens up the opportunity for verifying or justifying findings and evidence [Bowen, 2009, pp.29-30].

In contrast to literature review, for document analyses a systematic procedure of sampling and analysing is a prerequisite [Gross, 2018]. This systematic procedure ought to provide a structured examination and interpretation of a document 'in order to elicit meaning, gain understanding, and develop empirical knowledge' [Bowen, 2009, p.27]. The systematic review of documents can be conducted in a similar way as the systematic review of literature, as described in the previous section. In the course of Bryman's [2012] fourth step of the systematic review process, 'Analyse each study and synthesise the results' (Section 5.1) suggests a formal protocol containing a selection of categories that are 'methodological sound'. Here, 'methodological sound' means the identification of appropriate 'categories related to the central questions of research' [Bowen, 2009, p.32]. In relation to that, Bowen [2009] recommends an iterative process combining content analysis and thematic analysis. While the categorisation of information is characteristic of content analysis, the recognition of patterns within the collected data defines a thematic analysis.

In the context of this study, two in-depth document analyses of Vejle's Storm Surge Strategy and Vejle's Resilience Strategy were conducted. Referring back to Bowen's [2009] 'five specific functions of documentary material', the purpose of the document analyses is to (1) provide data on the local context within the subjects of local climate-adaptive and resilient planning and the concept of co-benefits and (2) to raise questions intriguing with further investigations by means of other methods (here, e.g. interviews or surveys). Their significance lies in the potential to contain information on how to bridge the gap between theoretical and practical implementation of decisions. According to Farthing [2016], the interest in development plans or strategies does not lie solely in the objectives and policies expressed by the 'hard infrastructure' but also why particular policies are being developed and pursued.

Last but not least, it needs to be mentioned that there some limitations to be considered and being aware of when using document analyses as a research method. Bowen [2009] points out the following three main limitations inherent in documents:

(1) *Insufficient detail:* Documents are nor produced for research and may lack sufficient information to answer research questions.

(2) *Low retrievability:* Difficulties in low or no retrievability may present a barrier.

(3) *Biased selectivity:* Incomplete collection of documents may suffer from selectivity influenced by the researcher's perspective [Bowen, 2009, pp.31-32].

5.3 Survey

According to De Vaus [2014], 'surveys are characterised by a structured or systematic set of data' that can distinguish in their form and the way they get analysed [Ibid., p.3]. The overall objective is to gain insight into the opinions, perspectives, and concerns of several individuals out of a group and ideally draw conclusions on the stance of an entire group [De Leeuw et al., 2008]. Before conducting a survey, there are several theoretical and practical considerations that need to take into account when designing a questionnaire (a written set of questions). These considerations include, among other considerations, about target group suitable to investigate the research topic, sample size, sample design, question formulation, and ordering, response process, and data collection methods [Bryman, 2012, Al Baghal, 2017, De Leeuw et al., 2008]. The following three sub-sections give a brief insight into (1) the preparation and design of the survey, (2) survey analysis, and (3) benefits and limitations. Since the survey conducted in this study was administered on the internet, the following considerations refer to a web-based design and representation.

Design of (Web-based) Surveys

Al Baghal [2017] refers to four steps within a response process that go through everyone's cognitive psychology while answering a question in a survey: (1) comprehensions, (2) retrieval, (3) judgement, and (4) formulation of a response. First, the question needs to be understood before it, second, can be associated with information in the memory or mind that is pertinent to the question. Third, an assessment process starts evaluating what is pertinent to the question entailing considerations like 'what do I want to tell the interviewer or survey conductor?'. In the last step, the respondent takes the pertinent information and formulates their response. While these steps also need to take into account when analysing the data collected through a survey, they also play a crucial role when formulating and ordering the questions in the design phase of the survey.

As respondents usually only want to spend little time with the response process of the survey, it is essential that the question and answer texts are kept 'short, concise, and clearly presented' [De Leeuw et al., 2008, p.276]. In addition, internet users often rather scan the questions than carefully read them [Ibid.]. Additionally, the questions have to be prepared in such a way that no assistance for completion is needed [Blaikie, 2010]. As a consequence, when formulating the questions, the target group should be considered. This refers to, for instance, particularly technical terms requiring prior knowledge or demanding texts that are difficult to understand by a certain group of respondents. The questions posed in the survey conducted in this study can be found in Appendix A (only the English version). As illustrated in Figure 5.1, representing the first page of the online survey, the questions could be answered in either English or Danish language. The prerequisite for taking part in the survey was the participants' current place of residence in Vejle.

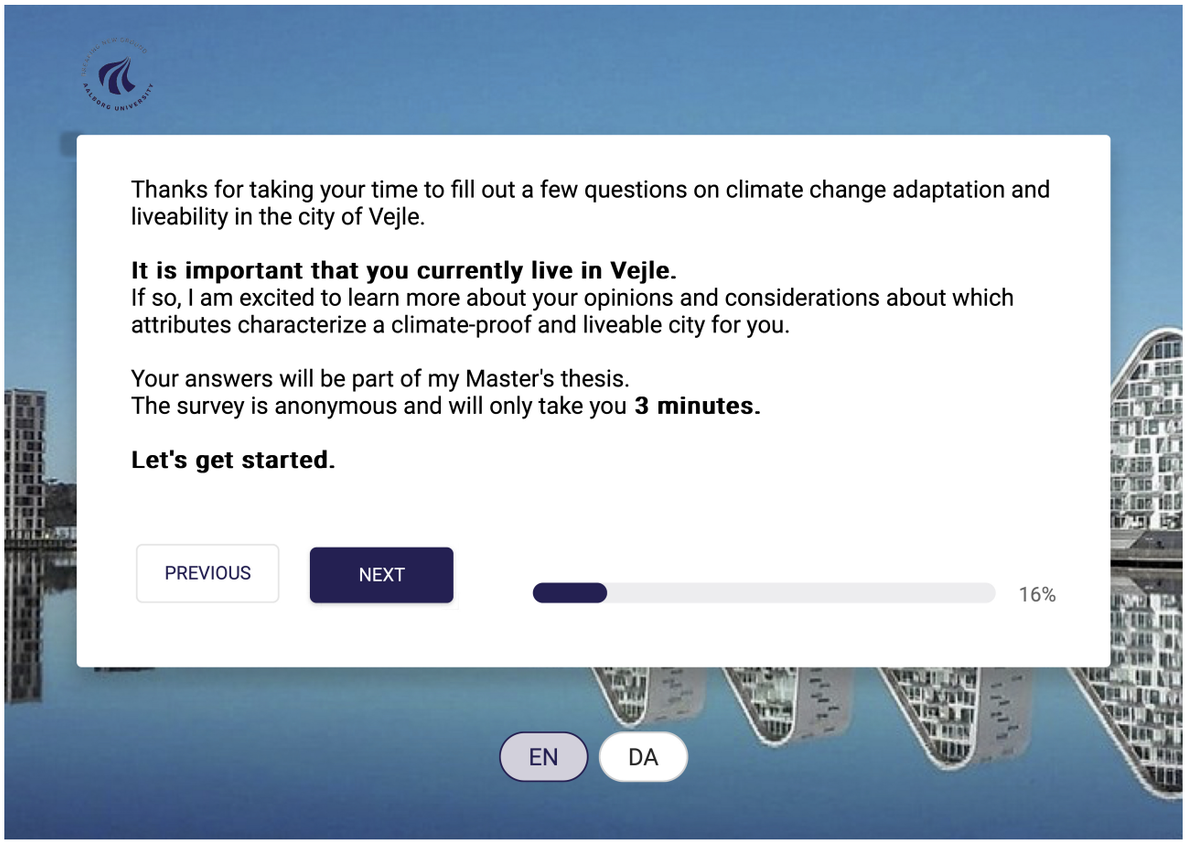

Figure 5.1: First page of the web-based survey conducted as one methodical part of this study (complete question catalogue can be found in Appendix A) [design and conduct via SurveyXact by Rambøll, 2019].

Analysis of (Web-based) Surveys

There are different methods of analysis. One example is the comparison of different cases to recognise patterns, investigate correlations and last but not least, identify causal relationships related to particular case characteristics. Since here, the survey is part of a single-case study; its purpose primarily lies in providing information on the perspectives of the local citizens. At this point, I will not go further into detail with concrete methods of data analysis including aspects such as a number of variables or categories, levels of measurement and weighting methods as thoroughly explained by various authors in this field of research [De Vaus, 2014, De Leeuw et al., 2008, Kaplan et al., 2012]. The procedure of data evaluation and analysis generated from the survey responses (listed in Appendix B) will be an integral part of Analysis I in Chapter 7.

Benefits & Limitations of Web-based Surveys

Internet or web-based surveys entail a couple of benefits and limitations. Online-administered surveys have the advantages that they prevent 'phrasing inconsistency and misinterpretation' verbally-conducted surveys [Kaplan et al., 2012, p.125]. Further, respondents might be more eager to answer the questions as they can choose the time and location of online participation. In general, the web-based conduct of the survey is less time-consuming for both the interviewer and the interviewee. In addition, the respondents' answers might be less biased since the 'four steps of cognitive psychology' (see previous sub-section) cannot be influenced by the presence of the interviewer.

However, these benefits can be twofold. First, there is still a small proportion of the population that has no access to the internet, and depending on the way of distribution (such as e-mail, web pages, and social networks), the addressed group of potential respondents may be further limited. Second, internet users can actively choose to participate or to not participate in the online survey. Their participation may be influenced by an already existing interest in the

survey topic. Thus, the web-based survey 'offers less control over sample composition' [Kaplan et al., 2012, p.125]. Third, their response process might not go through all the 'four steps of cognitive psychology', and the questions might be answered in a rather intuitive or random way. Last but not least, online surveys are at higher risk of fraud. For instance, it is impossible to trace whether all participants that stated to live in Vejle, truly live in the city.

5.4 Interviews

Interviews may be seen as a 'family of methods' and may vary in various characteristics such as their degree of structure, their degree of depth, and the number of interviewees (individual or group) [Farthing, 2016, pp.127-128]. The range of types from unstructured, through semi-structured to structured, is most common to be addressed in literature on qualitative research [Blaikie, 2010, Bryman, 2012, Creswell, 2014]. According to Farthing [2016], this interest relates to 'the degree to which the interviewer has control over the topic and the specific questions asked in the interview' [Ibid., p.128]. While a structured interview is designed in a way that the interviewer sticks to its schedule and prepared questions in a systematic way, the unstructured interview may usually start with a selection of topics the interviewer wants the respondent to talk about in a flexible and intuitive way [Bryman, 2012, Farthing, 2016]. The selection of topics may evolve during the interview process and from one interview to the next. In the course of this study, the conducted interviews (see Appendix D to Appendix X) were of a semi-structured type. Here, the interviewer has less control over the process than in a structured interview [Farthing, 2016]. This gives the interviewee a certain degree of freedom to control the interview in relation to the questions and topics raised. In this context, Adams [2015] refers to semi-structured interviews as the employment of 'a blend of closed- and open-ended questions, often accompanied by follow-up 'why' or 'how' questions' that may lead to a dialogue that 'meander[s] around the topics on the agenda [...] and delve[s] into totally unforeseen issues' [Ibid., pp.493]. As for the design and conduct of surveys, interviews require several theoretical and practical considerations prior to and during the interview process. The following three paragraphs provide an overview of (1) the preparation and design of the interviews, (2) considerations with regard to their analysis, and (3) the benefits and limitations of semi-structured interviews.

Design of Semi-structured Interviews

As the interview is conducted with the purpose of generating data that can be used to answer the research questions, its topic, questions, and structure are informed by an underlying problem formulation. In addition, it is 'crucial [...] that the questioning allows interviewers to glean the ways in which research participants view their social world' [Bryman, 2012, p.473]. This requires a certain degree of flexibility in the interview process as characteristic for the semi-structured way of conduct. In this study, the point of departure for the preparation of an interview guide was Sub-question III: *How do co-benefits of climate change adaptation inform the planning process of Vejle's Storm Surge Strategy?*(, where the first part of the question should be primarily answered through the method of a survey, as presented in the previous section). However, in order to not start with too many preconceptions, the interview guide should capture the meanderings around this Research Question [Bryman, 2012]. In addition, it should offer the opportunity to record what the respondent considers as significant and important in relation to the topic areas of the Research Question.

Appendix C represents the initial interview guides as set up before the first conduct of the interview with Jette Vindum (Appendix D). It contains eleven questions, of which three are

related to Urban Adaptation Measure Cards (UAMCs). They UAMCs were developed during my internship at the European Hub of the Urban Climate Change Research Network (UCCRN) in Naples, Italy (from September to December 2019), in the process of a classification and taxonomy framework of adaptation measures developed by the Horizon 2020 project [CLARITY, 2019]. The original version of the UAMCs was designed as an information and communication tool summarising performance indicators, costs, climate benefits, and co-benefits of specific CCA measures such as, for instances, rain gardens, green roofs, or permeable pavements. Initially, a contextualised version of the UAMCs (- with regard to specific adaptation actions pointed out in Vejle's Storm Surge Strategy -) was meant to be part of the research design. Due to the circumstances induced by COVID-19, workshops in the planning process of the Storm Surge Strategy needed to be postponed, and the practical usage of the UAMCs in such a workshop or in the framework of a focus group could not take place. However, two examples of UAMCs (- representing two actions stated in the Storm Surge Strategy -) were sent to the interviewees in order to allow them to gain a first impression of the UAMCs. Remote interaction with UAMCs turned out to be fairly complicated and valuable integration into the interview process hard to carry out. For this reason, the participants' feedback on co-benefits and SDGs addressed by the particular action presented on the UAMCs got not integrated into the analyses of the Research Questions. Thus, the interview guides functioned as an initial frame for addressing questions and certain topic areas that evolved over time. The transcribed protocols (Appendix D to X) as outcomes of the remote interviews show their semi-structured nature and make evident that the interview guides were not necessarily followed rigidly. That led to a number of unanswered questions by some respondents but also gave rise to new questions.

Analysis of Semi-structured Interviews

The 'hybrid' nature of semi-structured interviews (lying between that of structured interviews and unstructured ones) may lead to a few closed-ended questions that allow for 'hard numbers to cite' or 'a few simple tables and graphs' to create [Adams, 2015, p.504]. In general, the analysis of semi-structured interviews is much more time-consuming as follow-up responses and open-ended questions often require a rather qualitative than quantitative assessment. In this study, the analysis of the interview results will primarily focus on consolidating themes and trends that can be found in multiple answers. The results of the data analysis aim at contributing to a reasonable answer to Sub-question III, as examined in Chapter 9.

Benefits & Limitations of Semi-structured Interviews

As previously touched upon, semi-structured interviews are time-consuming not only with regard to their analysis but also their conduct. According to Adams [2015], semi-structured interviewing requires interviewer sophistication that enables them to be sensitive and adaptive to the interviewee's responses. Another disadvantage that is often argued is that the sample size of semi-structured interviews (- due to their time-consuming nature -) is often insufficient to ensure reliability and validity of the collected data.

Yet, with their inherent flexibility, semi-structured interviews may have the advantage to provide a more realistic picture of the interviewees' perspectives than a structured interview or survey does. The interviewer may ask questions that are not included in their interview guide by picking up on issues raised by the interviewee [Bryman, 2012]. Thereby, the adaptive capacity of the interview type can be used to get more detailed information on the interviewees' opinions, points of view, and concerns that might not have been revealed through a rigidly structured interview.

Chapter 6

Research Design Framework

Figure 6.1 represents a schematic overview of the overall research design. First, it states the methodological and conceptual problems with regard to the primary Research Question. These 'problems' raise questions that need to be considered in order to ensure a consistent methodology and conceptual framework (as an integral part of it) in favour of answering the two sub-question I, II, and II. According to Farthing [2016], a reasonable methodology needs to 'draw[] on debates about the nature of the social world and appropriate ways of finding out about it' [Ibid., p.4]. The preceding Chapters 3.1 and 3.3 provided an argumentation for the scientific rationale as well as for case study research informing the overall methodology of this study. The derived methodological conclusions informed the choice of methods suitable to investigate the research problem (Chapter 5).

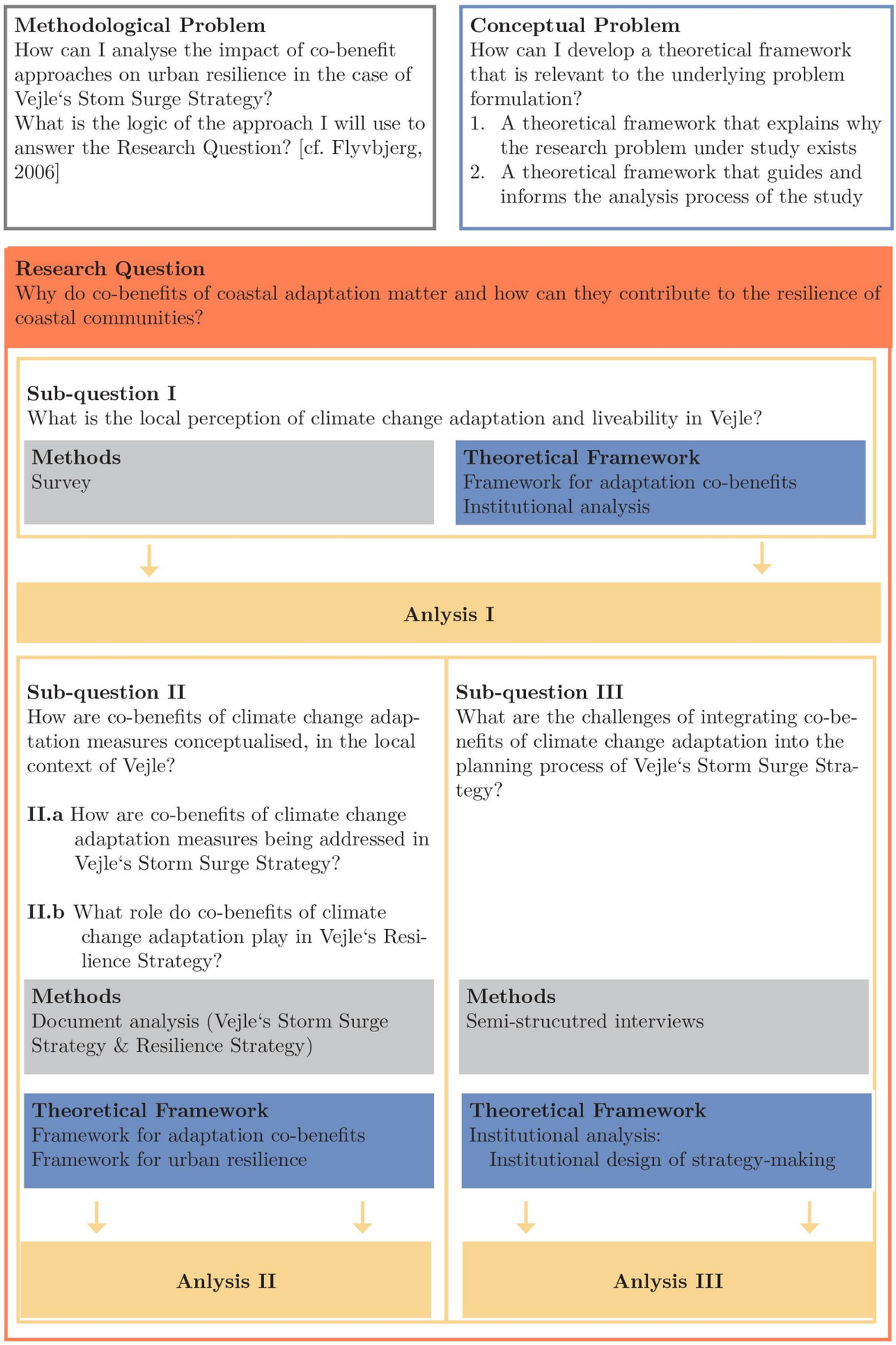

Figure 6.1: Schematic overview of research design: Methodological and conceptual relations of problem formulation, applied methods and theoretical framework guiding analysis I, II and III of this study.

III | Analyses & Results

This part consists of the Analyses I, II, and III unfolding Sub-questions I, II, and III, as stated in the previous chapter. By doing so Chapter 7 analyses the *local perception of climate change and liveability* in Vejle, Chapter 8 addresses *co-benefits and urban resilience* as conceptualised in Vejle's Storm Surge Strategy and the Resilience Strategy and, last but not least, Chapter 9 illuminates potentials and challenges of integrating *co-benefits in urban planning processes* in the local context of the Storm Surge Strategy. All three chapters are divided into three sections, the latter of which represent a *summary* of the main results obtained from the analysis.

Chapter 7

Local Perception of Climate Change Adaptation & Liveability

This chapter aims at unfolding Sub-question I: *What is the local perception of climate change adaptation and liveability in Vejle?*. The analysis is divided into three sections. While the first section analyses the local perception of CCA co-benefits with regard to perceived importance and interest in CCA issues, the second Section analysis criteria of liveability of the living and social environment as rated by the respondent. Last but not least, Section 7.3 summarises the results of Analysis I by conflating the examinations of Sections 7.1 and 7.2.

This analysis is based on a survey conducted on the internet. The posed questions and the respective responses can be found in Appendix A and B. The survey's purpose primarily lies in providing information on the local perception and perspectives of the local citizens on climate change adaptation. Referring back to the theoretical framework (Figure 3.6) the results of this section contributes to the analysis (Figure 4.6) of the 'soft infrastructure of relation-building' aiming at providing a full understanding of the local context and giving reasonable answers on the underlying Research Question [Healey, 1997, p.200]. This examination of the local context addresses the 'local perception of climate change adaptation' which includes (1) how the citizens rate the importance of climate change adaptation in interrelation with their interest in the topic (Section 7.1) and (2) the citizens' personal perspectives on criteria of liveability in their living and social environment (Section 7.2).

Before starting with the actual analysis, it is expedient to bring forward an argument for the formulation of sub-question I and its interrelation to the broader context of this study. I maintain that all three analyses Analysis I, II, and III are worth to be examined under the primary Research Question of *Why do co-benefits of climate change matter, and how can they contribute to urban resilience in the local context of Vejle?*. This argument builds upon the as-

sumption that the local perception of climate change adaptation may influence how co-benefit approaches inform the planning processes. This assumption is rooted in the fact that the Storm Surge Strategy puts a strong focus on increasing the quality of life of Vejle's citizen by integrating their ideas and collaborating with them in a way that creates a common understanding of challenges and opportunities [Vejle Kommune, 2020b]. This co-creative approach represents one of four strategic pillars of Vejle's Resilience Strategy that got integrated into the Storm Surge Strategy as analysed in the further context of Analysis II (Figure 8.1).

The following two sub-analyses take the distribution of climate change impacts as a point of departure. Figure 7.1 shows seven potential climate change impacts and their local significance on the respondents. The representation converted the weighting of climate change impacts on a scale from *0=not at all affected* to *5=highly affected* to an index on the scale from 0 to 100 that cannot be related to per cent values but solely represents the significance ascribed to the respective climate change impacts in relation to each other. (The detailed distribution of weighting factors can be seen in Figure A (Appendix B).) The figure implies that the respondents are most effected by increased rainfall intensity and frequency followed by flooding caused by heavy rainfall, economic impacts, health impacts, heat waves, sea-level rise, and last but not least coastal flooding. The last two responses give rise to ambiguities since it can be assumed that *sea-level rise* and *coastal flooding* are closely interrelated impacts.

Figure C (Appendix B) shows the results to the question *Who carries responsibility for initiating a response to the impacts of climate change?*. This question made multiple selections of response options possible, where the respondents could choose among public and private institutions, citizens, non-governmental organisations and other. The answers show that 92% put the responsibility for climate actions with the state government and 69% with the regional and municipal governments, respectively. 83% of the respondents see the responsibility of initiating response to climate change among the citizens themselves, and 56% among the private sector.

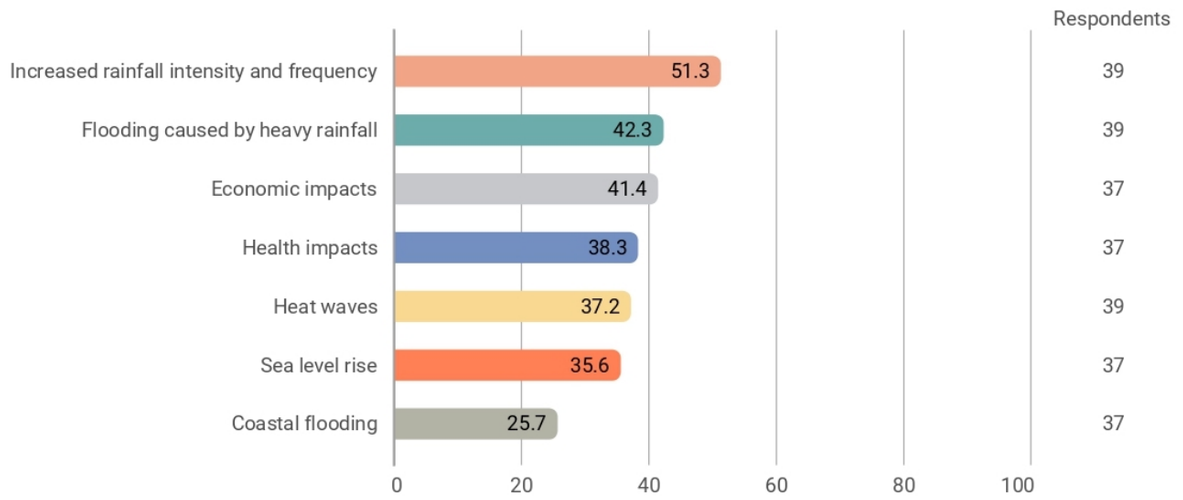

Figure 7.1: How climate change impacts personally affect the citizens of Vejle.

7.1 Perceived Importance of & Local Interest in Climate Change Adaptation

To analyse the perceived importance of and the local interest in CCA the results of the following three questions and their interrelations were analysed:

(1) *How important do you think climate change adaptation is?*

(2) *How do you rate your interest in climate change adaptation?*

(3) *Do you know any climate change adaptation measure or project that your city initiated?*

Figure 7.2 illustrates the perception of the importance of CCA (Question (1)) distributed among the respondents that know (answered with *yes*) and do not know any (answered with *no*) CCA measures or projects in Vejle (Question (3)). Only 8 of 35 respondents in total new any CCA project or measure from which 50% rate the importance of CCA as *5=very important*. However, though not informed about any CCA projects or measures, also 59% of the remaining 27 respondents evaluate the importance of CCA with *5=very important*. The low level of information about CCA action among the respondents leaves scope for causal interpretation: First, seeing importance in CCA might not be correlated with interest in CCA and, thus, the endeavour to inform themselves about any CCA-related actions. Second, Vejle Municipality does not release any or does not distribute sufficient information about its CCA projects and measures to the public. And, third, there are only a few CCA actions ongoing about which the respondents might know. Yet, the introduction of this study - including a comprehensive problem analysis of the case - has shown that the last two options and, in particular, the latter one are highly unlikely. Vejle Municipality promotes several ongoing CCA project and measures which put citizen involvement and participation high on their agenda [Vejle Kommune, 2020b, 2017, 2015, 2014].

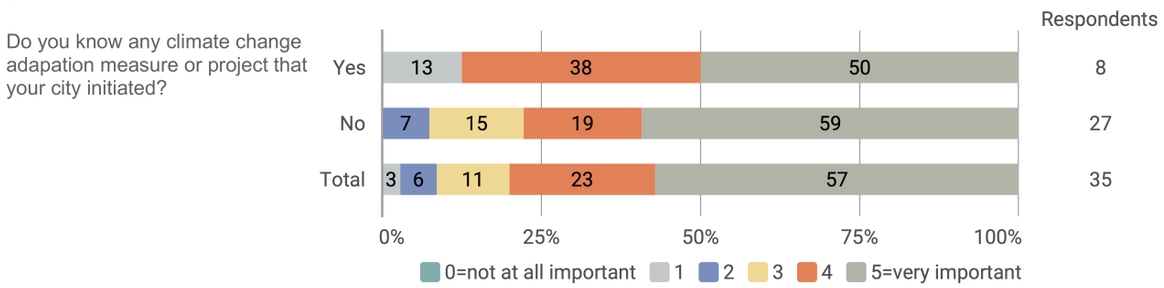

Figure 7.2: Perception of the importance of climate change adaptation in relation to Question (3) (*Do you know any climate change adaptation measure or project that your city initiated?*)

Figure 7.3 illustrates the interest in CCA (Question (2)) distributed among the respondents that know (answered with *yes*) and do not know any (answered with *no*) CCA measures or projects in Vejle (Question (3)). Among the eight respondents that know any CCA measures or projects in Vejle 50% rated their interest at the highest value (*5=very interested*) and additional 50% with the second-highest value. Thus, all eight respondents seem to be highly interested in CCA-related issues. Yet, also 66% of the respondents that do not know about any CCA action rated their general interest in CCA with *4* or *5=very interested* on a scale from 0 to 5.

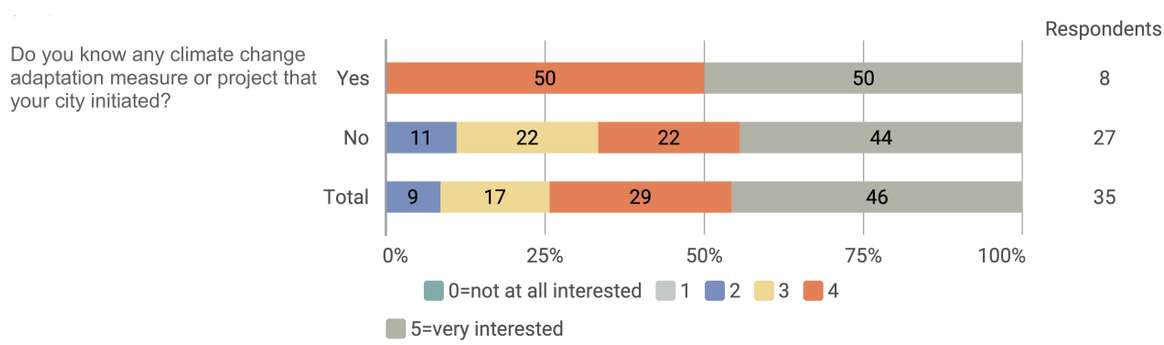

Figure 7.3: Interest in climate change adaptation in relation to Question (3) (*Do you know any climate change adaptation measure or project that your city initiated?*)

The correlation of the perception of importance of CCA (Question (1)) compared to the respondents' interest in CCA is represented in Figure 7.4. It shows that respondents that are

highly interested in CCA also rate their perceived importance of CCA at a very high value. 27 of 36 respondents rated their interest at the second-highest value *4* or the highest value *5=very interested*. Among these 27, 25 rated the importance of CCA at the same values (*4* or *5=very important*). Thus, the previously made assumption that seeing the importance in CCA might not be correlated with interest in CCA is not proven, in this case. However, a bigger sample size might have revealed a clearer picture, since in particular among the few respondents that indicated very little interest in CCA, one response attaches great weight to the overall value distribution.

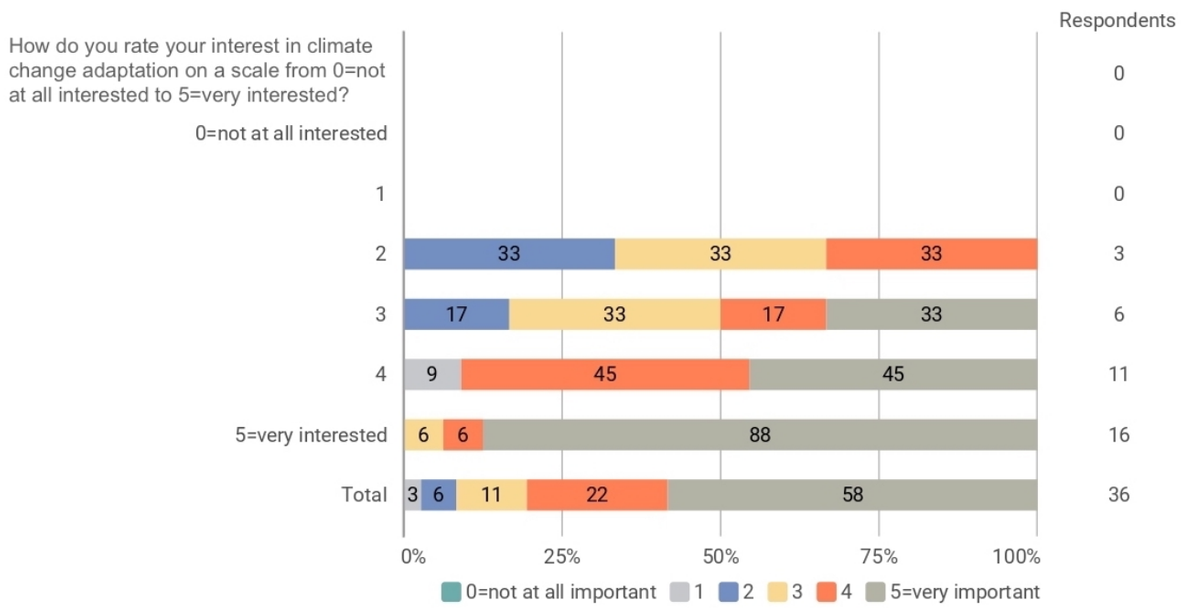

Figure 7.4: Perception of the importance of climate change adaptation in relation to Question (2) (*How do you rate your interest in climate change adaptation?*)

Furthermore, the valuation of *A city that actively involves its citizens in climate issues* as an important criterion for liveability for the living and social environment (see Figure 7.6) was compared to Question (2) (*How do you rate your interest in climate change adaptation?*). Among the respondents that rated their interest in CCA at *4* or *5=very interested*, 73% rated *A city that actively involves its citizens in climate issues* as an important criterion of liveability (*4* or *5=very important*). Respondents that were rather uninterested in CCA (rated at value *3* or lower) also tend to see the *A city that actively involves its citizens in climate issues* as a less relevant criterion of liveability.

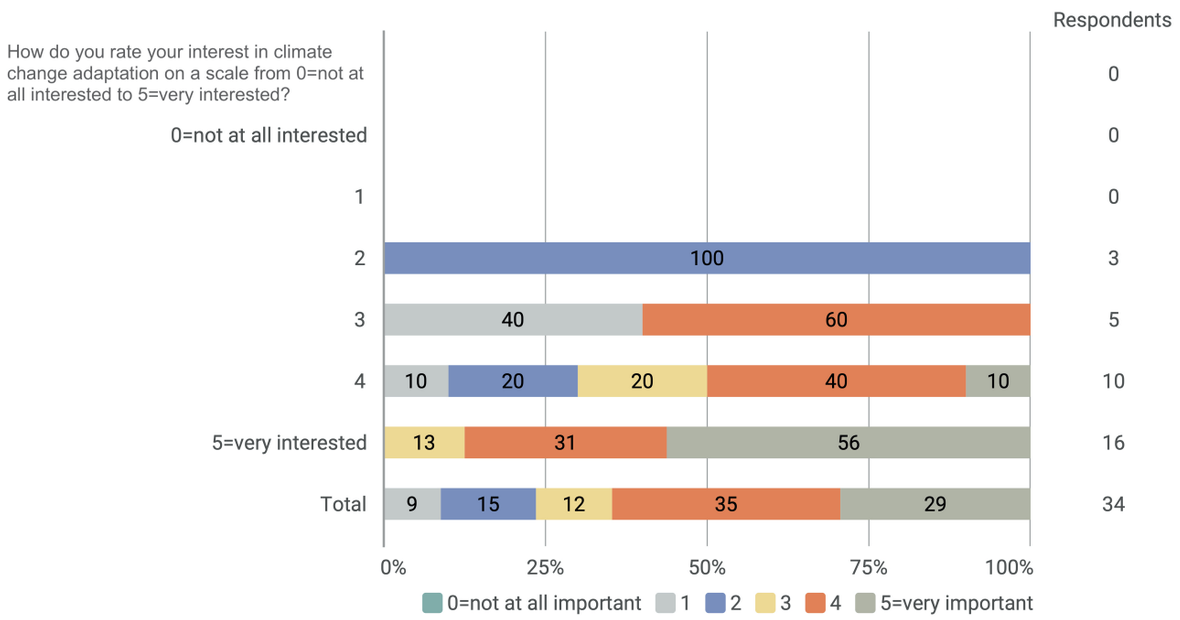

Figure 7.5: Valuation of the criterion of liveability *A city that actively involves its citizens in climate issues* in relation to Question (2) (*How do you rate your interest in climate change adaptation?*)

7.2 Local Perspectives on Criteria of Liveability

Figure 7.6 shows 13 response options of *criteria of liveability* of the living and social environment listed by their importance as rated by the respondents. (The results of all 13 response options with regard to the distribution of values rated on a scale from *0=not at all important* to *5=very important* can be found in Figure D (Appendix B).) As in the previous representation of local climate change impacts (Figure 7.1), the representation of Figure 7.6 converted the weighting of criteria of liveabiliy to an index on the scale from 0 to 100 that cannot be related to per cent values but solely represents the significance ascribed to the respective criteria of liveability in relation to each other. In can be seen that *good air quality* and *good water quality, collection, and security* are rated at high significance, followed by *an environment that benefits your health* and *vegetation, biodiversity, and green spaces*. In addition, also the criteria *a city that takes active action in safeguarding its citizens from climate change* and *a city that actively involves its citizens in climate issues* play an important role for the liveability of the living and social environment of the respondents. As seen in Figure 7.6, the three criteria rated at lowest importance for the liveability of a place were the following: (1) *good community cohesion*, (2) *innovation and investment*, and (3) *aesthetic value of the city* (importance ascending).

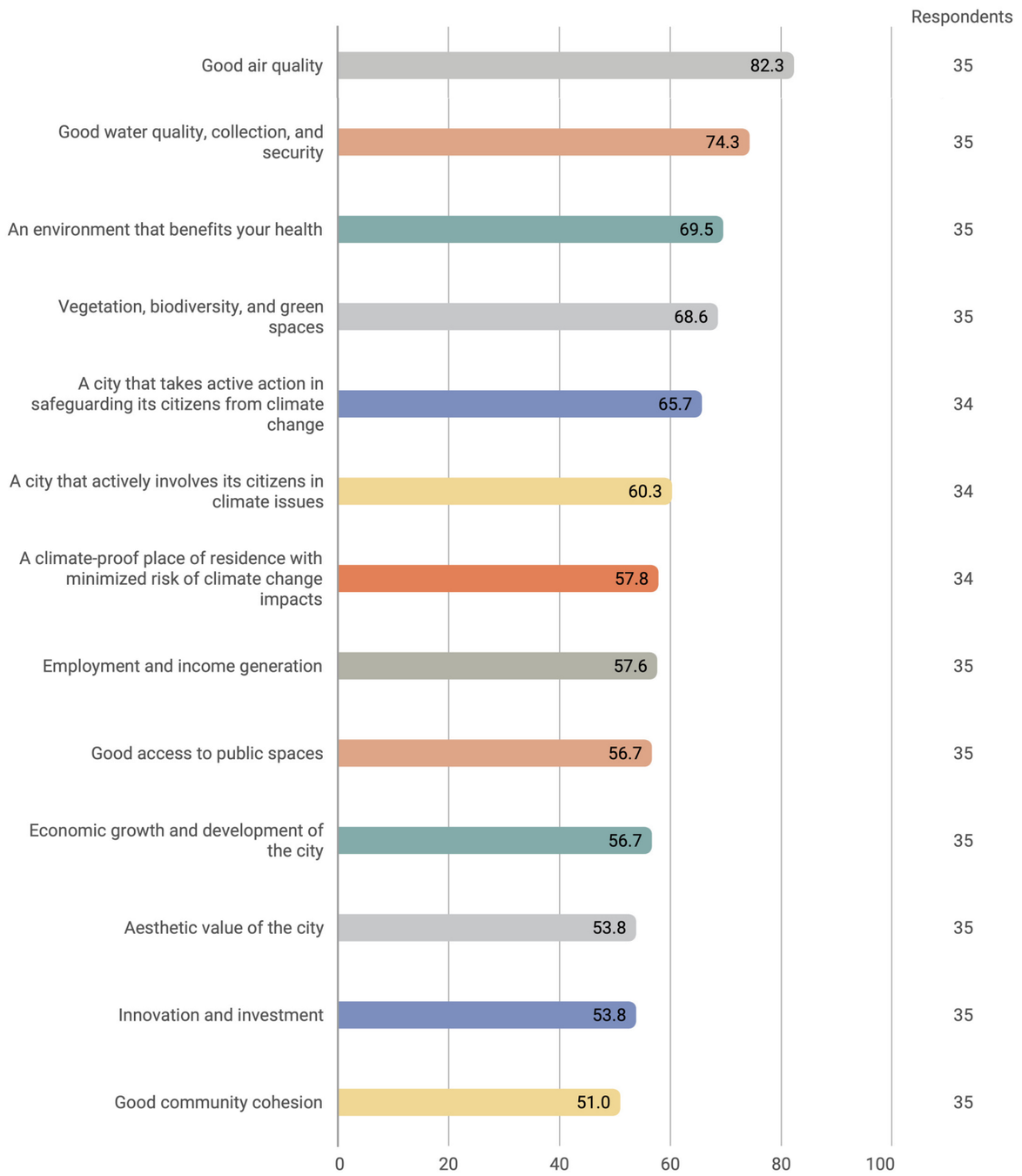

Figure 7.6: The six most important criteria of liveability of the living and social environment as rated by the respondents.

7.3 Summary

This section summarises the results of Analysis I based on a survey conducted on the internet. The questionnaire and the results of the survey can be found in Appendix A and B, respectively. The aim of this analysis was to picture the local perception of CCA (Section 7.1) and liveability (Section 7.2) of Vejle's citizens with the purpose of later discussion on the local significance of co-benefit approaches (cf. Research Question).

As a point of departure, Figure 7.1 illustrates the distribution of climate change impacts as perceived by the respondents. The majority of respondents are personally the most affected by *increased rainfall intensity and frequency* and *flooding caused by heavy rainfall*. These environmental climate change impacts are in their evaluation of significance closely followed by economic impacts and health impacts. Thus, there seems to be an awareness of the broader impact of climate change perceived at risks that go beyond the environmental pillar. Furthermore, the respondents ascribed responsibility for initiating response to these impacts primary

to the state government (92% of the respondents), closely followed by the citizens themselves (86% of the respondents) and the regional and municipal government (69% of the respondents).

Behind this context, the perceived importance of CCA was rated with values of *4* or *5=very important* (on a scale from 0 to 5) by 80% of the respondents. Furthermore, the analysis revealed that respondents perceiving CCA as important also show a high interest in the topic. However, only 23% of the respondents know any CCA measures or projects in Vejle. In this context, three assumptions for causal explanations for the lack of awareness were made: First, seeing importance in CCA might not be correlated with interest in CCA and, thus, the endeavour to inform themselves about any CCA-related actions. Second, Vejle Municipality does not release any or does not distribute sufficient information about its CCA projects and measures to the public. And, third, there are only a few CCA actions ongoing about which the respondents might know. Yet, the first option has proven wrong with claiming a linear correlation between perceived importance and interest (as stated above). Furthermore, the description of *Vejle as a case* (Chapter 4) has shown that the last two options and, in particular, the latter one is also highly unlikely. Vejle Municipality promotes several ongoing CCA project and measures which put citizen involvement and participation high on their agenda [Vejle Kommune, 2020b, 2017, 2015, 2014]. Yet, there must be an obstacle that hinders citizens from getting informed, informing themselves or engaging in urban climate issues. A fourth explanation might be a lack of time for informing themselves or the presence of other established priorities and intrinsic barriers that, in turn, influence the citizens' initiative to inform themselves [cf. Rodden and Wibbels, 2019, pp. 18-22]. This limited initiative or difficulties to access information is also reflected by the result of only 18% of the respondents that have ever expressed any concerns or suggestions to the Municipality (Kommune) (Figure B in Appendix B). Last but not least, an interplay of the aforementioned causes is most likely. In other words, mobilisation of citizen awareness needs to go hand in hand with establishing mechanisms that enable citizens access to information but also requires personal motivation that is influenced by the cultural and normative context (cf. Figure 3.5) [Hattke and Kalucza, 2019].

The previous paragraph touched upon importance, interest and awareness of CCA as perceived and expressed by the citizens of Vejle. This insight represents only a glimpse into the subject of citizen involvement, engagement, and co-creation that could open up for broad discussions but would go beyond the scope of this study. However, it is playing into the second part of this analysis addressing the perspective on liveability of the living and social environment (Section 7.2). This analysis was guided by the responses given to the question *Which criteria of liveability should the environment of your place of residence meet?*. The *criteria of liveablity* which the respondents were supposed to rate (on a scale from *O=not at all important* to *5=very important*) were a selection of 13 indicators inspired by the 14 CCA co-benefits as part of the conceptual framework (Sub-section 3.2.1). As pointed out above, there is a high interest and perceived importance in CCA. However, only a few respondents are aware of any CCA measures or projects in Vejle, and even fewer citizens have ever expressed any concerns or suggestions to the Municipality. Yet, more than 60% of the respondents rated *A city that actively involves its citizens in climate issues* as an important criterion of liveability (*4* or *5=very important*. *A city that takes active action in safeguarding its citizens from climate change* was rated slightly more important. These two criteria are preceded by environmental aspects such as *Good air quality* and *Good water quality, collection, and security* (in first and second places), *An environment that benefits your health* (in third place) and *vegetation, biodiversity and green spaces* (in fourth place). Less importance is ascribed - if also only slightly - to economic criteria such as *Innovation and investment*, *Economic growth and development of the city* and *Employment and income generation*. In general, however, the evaluation of the criteria is relatively evenly distributed, and their assigned significance lies close to each other (Figure 7.6 and Fig-

ure D in Appendix B). Thus, according to the respondents, it is not one criterion alone that predominantly influences the liveability and, in turn, the quality of their living environment but a selection of different environmental, social, and economic aspects. *(Here, to be noted: The interconnection and interdependencies between the criteria were not further analysed.)*

Chapter 8

Co-Benefits & Urban Resilience

This chapter aims at unfolding Sub-question II: *How are co-benefits of climate change adaptation conceptualised, in the local context of Vejle?*. The analysis is divided into three sections. The first two sections address the subordinate questions I.a) and I.b). Last but not least, Section 8.3 summarises the results of Analysis II by conflating the examinations of the questions II.a) (Section 8.1) and II.b) (Section 8.2) to prepare for later discussions on Sub-question II (Section 10.3).

8.1 Co-Benefits & Vejle's Storm Surge Strategy

This section analyses the following subordinate questions II.a) of Sub-question II: *How are co-benefits of climate change adaptation measures being addressed in Vejle's Storm Surge Strategy?*. As mentioned in Section 4.1, Vejle's Storm Surge Strategy is one of the priority projects of its Resilience Strategy. It acts under the guiding principle of 'Storm flood protection[1] that grows with the city: Resilient ambitions for Fjordbyen' (Stormflodsbeskyttelse der gror med byen: Resiliente ambitioner for Fjordbyen). Section 4.2 touched upon the term *added value* (merværdi) as one of the central concepts in Vejle's Storm Surge Strategy(, besides adaptivity and flexibility [see Tiselius, 2020, App. E]). The following sub-sections examine, first, the understanding of added value as understood and conceptualised in the Storm Surge Strategy and, second, the concepts' interpretation through the lenses of the conceptual framework of co-benefits, as presented in Sub-section 3.2.1.

The Central Concept of Added Value

As stated in Section 4.1, the Storm Surge Strategy puts emphasis on added value in one of the following three strategic criteria it is based on: (1) All storm surge measures must strengthen Vejle's identity, (2) water as an asset for urban and social capital, and (3) all storm surge actions must follow three basic principles [Vejle Kommune, 2020b]. These three principles include among the safeguarding of the city to a determined level and the contribution to 'the good meeting with the water' (related to Vejle's identity), the assurance of added value [Ibid., p.15]. In this context, added value is defined as recreational value by providing 'blue-green qualities' (blå-grønne kvaliteter), improved physical health of citizens through stimulation of everyday exercise, improved mental health by reducing insecurity and stress, and a positive environmental impact promoting a healthy fjord environment [Vejle Kommune, 2020b, p.40]. Figure 8.1 illustrates the aforementioned three strategic criteria, including the third three basic

[1]The here used term 'storm flood protection' corresponds to the terminology as used in the Storm Surge Strategy. Among scholars the understanding of 'storm surge/flood protection' usually refers to 'hard infrastructure' (e.g. dykes, levees, seawalls) and the one of '(coastal) adaptation' to 'soft infrastructure' such as nature-based solutions as focused in Vejle's Storm Surge Strategy [cf. Al, 2018]. However, in the following course of this analysis it is adhered to the 'misused' term of storm surge protection as stated in the Storm Surge Strategy.

principles for storm surge actions and the definition of added value, as stated in Vejle Kommune [2020b].

Searching for *added value* (merværdi) throughout the report leads to 21 results spreading over 15 pages. By skimming these results, the following core statements, including added value as a central concept were identified and filtered out:

- Storm surge protection must create added value and contribute to the development of Vejle City;
- The development of a resilient district at Vejle Fjord where storm surge protection [adaptation] with added value and sustainable climate adaptation go hand in hand;
- Resilient ambitions must be taken into account to create a city where urban development and storm surge protection with added value go hand in hand;
- We must ask the citizens to take a stand and come up with ideas of what they connect with added value when we are talking about a climate-resilient future city;
- Added value means storm surge protection that provides the city and its citizens 'something more' than flood protection;
- Added value must strengthen the identity of the city and promote a good life and meeting with the water;
- Securing housing better against flooding in a way that provides added value to the area *(expressed as a sub-goal formulated by citizens)*;
- Measures are supposed to contribute to added value by creating recreational spaces;
- The combination of nature and infrastructure has added value at several levels [Vejle Kommune, 2020b].

To summarise the statements listed above, the following conclusions can be drawn: In the context of Vejle's Storm Surge Strategy, the concept of added value is central. Creating added value to storm surge protection is understood as mutually inclusive with sustainable CCA. This is seen as a prerequisite for resilient development of the city where the resilient ambitions can be formulated as the four focus areas of Vejle's Resilience Strategy: (1) A co-creating city, (2) a climate-resilient city, (3) a socially resilient city, and (4) a smart city (see Criterion 2 in Figure 8.1). These resilient ambitions are integrated into ongoing urban development [Vejle Kommune, 2020b, p.33]. In turn, added value must go hand in hand with Vejle's everyday urban planning that is based on strengthening the identity of the city and its citizens and promoting a good life and meeting with the water (cf. Criterion 1 in Figure 8.1). Thus, the inherent characteristic of providing something more than safeguarding the city from flooding must be aligned with the overall objectives of the cities urban development being commensurate with underlying resilient ambitions.

As mentioned above, this 'something-more characteristics' of added value can be defined as four principles, including positive health impacts on the citizens going hand in hand with a recreational value provided by nature-based 'blue-green qualities' and a positive environmental impact (Criterion 3 in Figure 8.1). In this context the combination of nature and infrastructure bear added value at several levels since they may promote the previously mentioned four principles by, for instance, providing storm surge protection measures that create recreational spaces that invite to stay, provide experiences and a basis for community unity [Vejle Kommune, 2020b, pp.33-35].

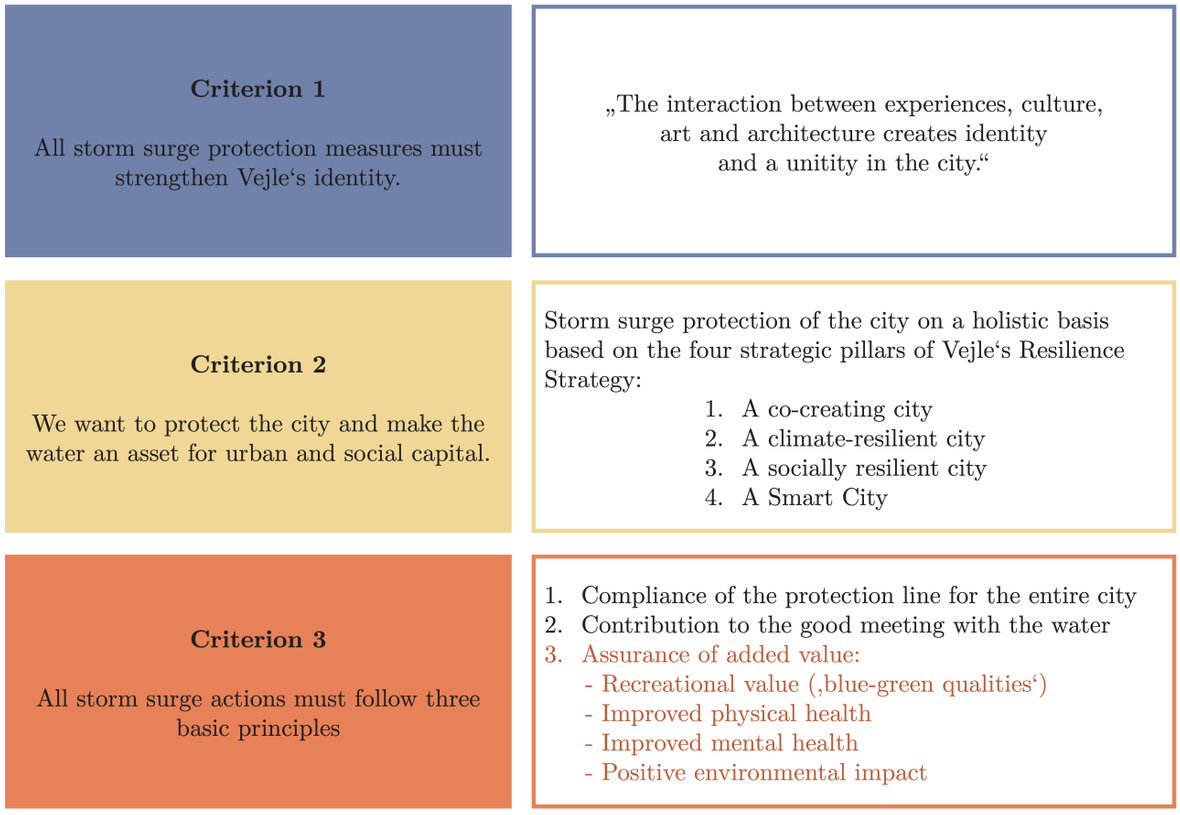

Figure 8.1: Three strategic criteria of Vejle's Storm Surge Strategy: (1) All storm surge protection measures must strengthen Vejle's identity; (2) Water as an asset for urban and social capital; and (3) All storm surge actions must follow three basic principles [based on Vejle Kommune, 2020b].

Added Value & The Framework of Co-Benefits

This sub-section applies the findings of the previous section to the theoretical framework of co-benefits, as set up in Sub-section 3.2.1. By referring back to the classification of co-benefits, it becomes apparent that there is an extensive overlapping between the understanding of added value in the Storm Surge Strategy and the theoretical considerations of co-benefits. First, added value is defined as 'something more than flood protection'. Thus, it intends to expand beyond the sole climate benefit of flood risk reduction (cf. Figure 3.2). Second, comparing the previously mentioned characteristics of added value with the 14 environmental, social, and economic co-benefits of CCA pointed out in Table 3.2 their similarities become evident. Central is the strong emphasis of added value on the four social co-benefits that are addressed by (1) reduced (physical and mental) health impacts, (2) increased access to public (recreational) spaces, (3) increased aesthetic value by creating places that invite to stay, and (4) increased community cohesion (/unity) [Vejle Kommune, 2020b, pp.33-40]. Yet, formulated in a more specific way, most of the six environmental co-benefits are likewise incorporated in the understanding of added value, even if less explicitly. 'Positive environmental impact' as one of the four main characteristics of added value (see Criterion 3 in Figure 8.1) may be interpreted all environmental co-benefits. In addition, 'nature' is among the three major themes (water, nature, and art) of Vejle's Storm Surge Strategy. The combination of nature and infrastructure ought to be utilised to great social, environmental and economic synergies and create more resilient solutions [Vejle Kommune, 2020b, p.32]. Nature-based solutions with 'blue-green qualities' bears co-benefits such as increased biodiversity, improved air quality, and improved water quality (cf. Table 3.1). In addition, all flood protection measures must be based on a circular mindset contributing positively to the city's carbon footprint and, thus, must entail the co-benefit of reduced GHG emissions [Vejle Kommune, 2020b, p.72]. Last but not least, also economic objectives are touched upon in Vejle's Storm Surge Strategy. Even if there are not mentioned in

relation with the term *added value* the promotion of economic growth while reducing the risk of flooding is central to Vejle's ambitions of creating a city where resilient urban development and storm surge protection with added value go hand in hand [Ibid., p.63]. Economic growth may include the economic co-benefits of *employment and income generation*. Furthermore, the Storm Surge Strategy stresses the importance of securing both investment and property value [Vejle Kommune, 2020b, p.5]. Since the final action catalogue is not yet formulated, more specific considerations with regard to economic co-benefits are difficult to take. The following table summarises the definition of added value (merværdi) as understood in Vejle's Storm Surge Strategy applied to the classification of environmental, social, and economic co-benefits of theoretical framework (cf. Table 3.1).

Table 8.1: Definition of added value (merværdi) in Vejle's Storm Surge Strategy *(in italic)* applied to the classification of environmental, social, and economic co-benefits of the theoretical framework.

Environmental	Social	Economic
Blue-green qualities: Increased biodiversity	Reduced health impacts *(Improved physical and mental health)*	*Promotion of economic growth while reducing the risk of flooding:* Employment and income generation
Positive environmental impact: Improved air quality	Increased access to public *(recreational)* space	
Improved water quality	Increased aesthetic value *(creating places that invite to stay)*	*Design flood defenses to encourage investment, development and reale estate value:* Innovation and investment
Positive impact on city's carbon footprint: Reduced GHG emissions	Increased community cohesion *(/unity)*	Increased property value

Referring to the taxonomy of CCA co-benefits (Sub-section 3.2.1), means to investigate the CCA co-benefits hidden behind the term added value (Table 8.1) with regard to their inherent three dimensions: (1) intentionality, (2) scope, and (3) scale [Floater et al., 2016]. According to all interviewees working in the project of the Storm Surge Strategy, despite a strong focus on added value, the primary objective of Vejle's Storm Surge Strategy remains the safeguarding of the city from storm surges and resulting flooding (see Appendices D to G). Thus, even if strongly intended co-benefits would be seen as secondary objectives. However, Floater et al. [2016] point out a third type of intentionally sought co-benefits that arise as among several simultaneous objectives in an integrated policy approach. Here, the 'principle of integrated decision making' [Ibid., p.18] refers to assessing policy options based on overall net benefits across multiple urban development objectives, plans, and strategies. The previous sub-section revealed the importance of aligning storm surge strategy, added value, and resilient development. As one of the priority actions in Vejle's Resilience Strategy, the Storm Surge Strategy incorporates the four strategic pillars of the city's resilience vision (see Criterion 2 in Figure 8.1). The initiatives within the strategic pillars are 'integrating resilience into new visions, policies and strategies for Vejle's development' [Vejle Kommune et al., 2016, p.23]. Conversely, that implies that the co-benefits interpreted as added value, as pointed out in the Storm Surge Strategy, are prerequisite and among several simultaneous objectives to ensure an integrated policy approach to 'secure full integration of future city plans and city development plans' [Vejle Kommune et al., 2016, p.25].

As stated in Sub-section 3.2.1, the *scope* of CCA co-benefits as the second dimension may lay in (1) stimulating action on CCA, (2) 'generating of climate adaptation goods and services', and (3) 'advancing sustainable development' [IPCC, 2014c, pp.910-911]. As emphasised in the

interview with Helle Thorhauge, it is important to create added value and show the citizens and politicians that storm surge protection is about safeguarding the city and its citizens but also about creating 'something more' [Thorhauge, 2020][2]. Furthermore, she talked about allocating accountabilities, in particular, with regard to financial means. In other words, to instrumentalising co-benefit approaches for stimulating action. The early development status of the Storm Surge Strategy makes it difficult to assess if the incorporation of climate adaptation goods and services such as technological solutions will be incorporated in the solution catalogue of storm surge protection measures. (The solution catalogue is expected to be finalised, in the end of 2021.) According to IPCC [2014c], another scope may lay in the 'advancing of sustainable development' [Ibid., p.911]. As emphasised throughout the study and mentioned by Lotta Tiselius as 'sort of a public identity', resilient development represents the core vision of Vejle (Appendix D). In this context, it has been argued earlier that added value and co-benefits of the Storm Surge Strategy aim at contributing to the implementation of resilient principles (Section 8.1. Thus, the scope of CCA co-benefits in the context of Vejle's Storm Surge Strategy lies clearly in advancing resilient development. Here, a broader discussion on similarities and relationships between the use of terms and concepts of sustainability and resilience could be opened up [cf. Marchese et al., 2018] but would go beyond the scope of this research work.

Last but not least, the dimension of *scale* addresses temporal and geographical considerations of co-benefit impacts. As touched upon in Sub-section 3.2.1, these considerations come along with difficulties in assessing the variation of co-benefits across spatial and temporal scales [Raymond et al., 2017]. The co-benefits pointed out in Table 8.1, such as reduced health impacts and increased biodiversity, span different spheres of socio-ecological systems and, thus, may vary across spatial and temporal scales [cf. Raymond et al., 2017]. Distinguishing the impact of the spatial scale not only with regard to local, national and global levels but also within the urban system requires to consider interdependencies between different CCA co-benefits of different measures and other spatial impacts. Additionally, as for the delivery of climate adaptation goods and services, also for the scale, it is even more difficult to make a final assessment without knowledge about the concrete solutions.

8.2 Co-Benefits & Vejle's Resilience Strategy

This section addresses the second subordinate questions II.b) of Sub-question II: *What role do co-benefits of climate change adaptation play in Vejle's Resilience Strategy?*. As the main focus lies in Vejle's Storm Surge Strategy, this question refers to the co-benefits interpreted as added value examined in Section 8.1 (cf. Table 8.1). There, initial evidence has uncovered the interconnection between these co-benefits and the resilient vision formulated in Vejle's Resilience Strategy. This section takes a closer look at the Resilience Strategy and how the co-benefits of the Storm Surge Strategy may contribute to its implementation. Therefore, the following subsection examines how the co-benefits of the Storm Surge Strategy are addressed and rooted in the Resilience Strategy. Sub-section *Co-Benefits & The Framework of Urban Resilience* applies the co-benefits of Vejle's Storm Surge Strategy (Table 8.1) to the framework of urban resilience, as pointed out in Sub-section 3.2.2.

Co-Benefits of the Storm Surge Strategy & Vejle's Resilience Strategy

This section aims to relate the environmental, social, and economic co-benefits pointed out Vejle's Storm Surge Strategy (Table 8.1) to the objectives stated in the Resilience Strategy.

[2]Here, the citation of the interviewee adheres to the general citation style of this study by giving the last name of the cited interviewee and the year in square brackets. The transcribed results of all interviews can be found in Appendices D to H. (Note that citations do not appear in the preceding list of references.)

It examines how the benefits are addressed (1) in the four strategic pillars of resilience (cf. Criterion 2 in Figure 8.1), (2) in the 12 strategic goals, and (3) in the Resilience Values of the 100 actions. Here, Resilience Value is defined as 'shared objectives and metrics that would help to capture a resilience dividend' and provide 'a resilience opportunity to create resilience value for a range of stakeholders' [Ruibal and Van der Leeden, 2016]. Table 8.2 summarises the environmental, social, and economic co-benefits of Vejle' Storm Surge Strategy (Table 8.1) as addressed by the Resilience Strategy, expressed in the strategic pillars, strategic goals, and Resilience Values of the supporting actions. Furthermore, it lists the number of hits throughout the Resilience Strategy indicated in brackets.

Though one of the three major themes of Vejle's Storm Surge Strategy, the role of nature or nature-based solutions and the environmental co-benefit of increased biodiversity is rather vaguely formulated in the Resilience Strategy. Explicit formulations of environmental objectives can only be found in a few Resilience Values of three strategic pillars addressed by five different actions. Social and community objectives related to the four social co-benefits pointed out in Table 8.1 experience greater visibility in the Resilience Strategy. A strong emphasis is put on the improvement of health and wellbeing and the promotion of community cohesion. Some of the social co-benefits pointed out in Table 8.2 have overlapping characteristics such as 'a healthy lifestyle' and 'good physical and mental health'. Like the promotion of wellbeing also, the promotion of economic growth is a central theme in Vejle's Resilience Strategy. The generation of new jobs plays a key role in this context.

Table 8.2: Environmental, social, and economic co-benefits of Vejle's Storm Surge Strategy as incorporated in the Resilience Strategy addressed by its strategic pillars, strategic goals and Resilience Values of the supporting actions (number of hits in brackets) [Vejle Kommune et al., 2016]

Environmental	Social	Economic
• Create greater awareness and appreciation of natural and physical assets in the city (2) • Promote a healthy environment for the community (1) • Contribute to a cleaner environment (2) • Improve air quality (1)	• Promote/Improve the health and wellbeing of communities in Vejle (6) • A healthy lifestyle (2) • Good physical and mental health status (1) • Make urban spaces and social housing central to community cohesion (7) • Create inclusive spaces (1) • Promote/increase social/ community cohesion (20) • Strengthen cohesion across the city (1)	• Promote economic growth and prosperty (7) • Generating new jobs (8) • Use innovation to address challenges (1)

Co-Benefits & The Framework of Urban Resilience

This sub-section deals with the question of how the co-benefits pointed out in Vejle's Storm Surge Strategy (Table 8.1) is informed by the Framework for Urban Resilience, as pointed out in Sub-section 3.2.2. Therefore, the environmental, social, and economic co-benefits are set into relation to the CRF of 100RC (Figure 3.3). The eight characteristics of resilient systems (Figure 3.4) in the context of the Storm Surge Strategy's co-benefit approach will be taken into considerations in later discussions (Part9.3).

To assess the co-benefits through the lenses of the CRF the four dimensions and, respectively, the 12 drivers of the CRF need to be illuminated more in-depth. The combination of nature

and infrastructure and, thus, the increase of biodiversity and other positive environmental impacts such as improved air quality is 'ecosystem services that entail 'environmental assets' being central in the driver *Reduced exposure and fragility* of the CRF [The Rockefeller Foundation and Arup, 2015, p.11]. Human health and life play a central in the driver *Effective safeguards to human health and life*. Yet, according to The Rockefeller Foundation and Arup [2015], the driver 'relies on integrated health facilities and services' where services are referred to 'education, sanitation, epidemiological surveillance, and vaccination [Ibid., p.10]. Thus, though the co-benefit of *Reduced health impacts* may contribute to the aforementioned driver, they are different in their origins. The two social co-benefits *Increased access to public space*, and *Increased community cohesion* are encompassed by the driver *Collective identity and community support* addressing the 'provision of communal facilities, public spaces and physical accessibility [] to strengthen community cohesion', among others [The Rockefeller Foundation and Arup, 2015, p.11]. Last but not least, also the economic co-benefits are, to a greater or lesser extent, addressed by the CRF. The driver *Diverse livelihoods and employment* focuses on 'mechanisms through which diverse livelihood and employment opportunities can be generated' [The Rockefeller Foundation and Arup, 2015, p.10]. The economic co-benefit of *innovation and investment* is integrated into the driver *Sustainable economy*, which includes the 'ability to attract business investment, adequate investment, and emergency funds' [Ibid., p.7].

8.3 Summary

This section summarises the results of the previous Analysis II by conflating the examinations of the questions I.a) (Section 8.1) and II.b) (Section 8.2) to prepare for later discussions on Sub-question II (Section 10.3).

The analysis of the subordinate question II.a) has revealed the great significance of CCA co-benefits in the strategic pursuit of Vejle's Storm Surge Strategy. The central theme and main focus are to provide the citizens of Vejle with added value along with storm surge protection. Added value is explicitly formulated as the Strategy's endeavour of (1) contributing with recreational value (nature-based 'blue-green qualities'), (2) improving physical and mental health, and (3) creating a positive environmental impact (see Criterion 3 in Figure 8.1). Despite these explicitly stated characteristics of added value, the Storm Surge Strategy includes a number of additional understandings and conceptualisations that are associated with the term added value. Sub-section *Added Value & The Framework of Co-Benefits* revealed added value as mutually inclusive with sustainable CCA that, in turn, is a prerequisite for pursuing Vejle's resilience vision. In this context, sustainable CCA means to contribute with other environmental, social, and economic co-benefits next to direct climate benefits to integrating the ongoing urban development informed by the resilient ambitions of the city [Vejle Kommune, 2020b, p.33].

Sub-section *Added Value & The Framework of Co-Benefits* applied the understanding of added value to the framework of co-benefits (Sub-section 3.2.1). As summarised in Table 8.1, most of the co-benefits pointed out in earlier classifications are to a greater or lesser extent addressed in Vejle's Storm Surge Strategy if also not explicitly mentioned in relation to the discourse of added value. There is an apparent focus on nature as a central theme in combination with the provision of social co-benefits such as increasing access to recreational space and creating places that invite to stay (cf. Table 8.1). Environmental and economic co-benefits are less explicitly mentioned. However, two of the characteristics of added value are described by 'blue-green qualities' and a 'positive environmental impact', where the latter my include co-benefits such as improved air and water quality. The 'promotion of economic growth while reducing the risk of flooding' is taken as an underlying paradigm and deeply rooted in

Vejle's resilience vision. [Vejle Kommune, 2020b, Vejle Kommune et al., 2016]. Yet, at that time of development status, it is difficult to gain detailed information on potential economic co-benefits entailed by the coastal adaptation measures, since a final solution catalogue will not be released before the end of 2021 [Vejle Kommune, 2020b, p.47].

Consideration on the taxonomy of the co-benefits addressed in Vejle's Storm Surge Strategy referred to the following three dimensions: (1) intentionality, (2) scope, and (3) scale [Floater et al., 2016]. It can be concluded that the co-benefits are intentionally sought, arising among several simultaneous objectives in an integrated policy approach [Ibid.]. Since the Storm Surge Strategy is one of the priority actions in Vejle's Resilience Strategy the contribution to resilient development is evident. Furthermore, it was argued that storm surge protection with added values (coastal adaptation), sustainable CCA, and resilient development go hand in hand [Vejle Kommune, 2020b]. Thus, the scope of the CCA co-benefits lies in advancing resilient development. The temporal and geographical scale of the co-benefits was difficult to access since that would require knowledge about concrete coastal adaptation measures and their impact. In general, an assessment is challenging since this requires methods that take 'the changing dynamics of the system at a variety of [...] scales' into account [Raymond et al., 2017, p.21].

Section 8.2 analysed how the CCA co-benefits of the Storm Surge Strategy are incorporated in Vejle's Resilience Strategy. Noticeable is the strong focus on social, and economic objectives that potentially may be satisfied by the provided co-benefits. In particular, the strengthening of social cohesion has high priority and the promotion of economic growth and prosperity (Table 8.2). The major focus on nature of the Storm Surge Strategy seems to play a less significant role in Vejle's Resilience Strategy but experiences a greater focus in 100RC's CRF (Figure 3.3). *Reduced exposure and fragility* is one of the four main dimensions and incorporated the environmental assets of ecosystem services such as increased biodiversity or improved air quality [The Rockefeller Foundation and Arup, 2015, cf. p.11]. The strong focus on social cohesion in Vejle's Resilience Strategy gets reflected by the CRF's driver of *Collective identity and community support*. Last but not least, the CRF addresses the economic co-benefits of the Storm Surge Strategy (Table 8.1) by focusing on *Sustainable economy* by fostering 'the ability to attract business investment, adequate investment, and emergency funds' [The Rockefeller Foundation and Arup, 2015, p.7].

Chapter 9

Co-Benefits in Urban Planning Processes

This chapter aims at unfolding Sub-question III: *What are the potentials and challenges of integrating co-benefits of climate change adaptation into the planning process of Vejle's Storm Surge Strategy?*. The analysis of this question focuses on five interviews that were conducted in a semi-structured way from which four were held with employees of Vejle Municipality that are involved in the planning process of the Storm Surge Strategy (Jette Vindum, Lotta Tiselius, Helle Thorhauge, and Christina Olsen). One additional interview was conducted with, first, Ole Fryd, who was as a researcher involved in Realdania's project 'Cities and the rising sea water' (Byerne og det stigende) [Fryd and Jørgensen, 2020]. The purpose of the interviews was to (1) get a detailed insight into the planning processes around Vejle's Storm Surge Strategy and (2) to back up the results with external perspectives of interviewees that either were externally involved in the planning process (outside of Vejle Municipality) or that were informed about the approaches pursued in the Strategy and the field of research focus in this particular local context.[1] The section is divided into three sections addressing (1) the potentials of integrating CCA co-benefits (Section 9.1), (2) the challenges of integrating CCA co-benefits (Section 9.2), (4) a summary of Analysis III outlining the main findings and outcomes (Section 9.3).

9.1 Potentials of Integrating Adaptation Co-Benefits

In the course of the interviewing process five key assets turned out to be most associated with potentials of integrating CCA co-benefits in urban planning processes: (1) Flexibility and adaptivity, (2) discourse strategy, (3) legitimacy and accountability (4) social inclusion and justice, (5) resilient development. There may be overlapping characteristics between the five potentials of integrating CCA co-benefits into urban planning processes. Therefore, there must not necessarily be seen as distinct but rather as potentially interfering or reinforcing.

Flexibility & Adaptivity

According to Fryd [2020], adaptive pathways and co-benefit driven approaches entail a higher degree of flexibility and dynamic adaptation over time than *hard infrastructure* such as dykes and levees[2]. In this context, he talks about the 'levee paradox' that is understood as the risk of constructing hard infrastructure that may 'lead[] to lowered community awareness of the risks of flooding and increased development in the "protected" area' and, in turn, to 'larger losses in less frequent but deeper floods when levees overtop or fail' [Gissing et al., 2018, p.38].

[1] In the following, the citation of interviewees adheres to the general citation style of this study by giving the last name of the cited interviewee and the year in square brackets. In case of direct quotations, the page number gets replaced by the appendix and the time at which the transcribed quote can be found, leading to the following representation: [Last name, year, App., minutes:seconds]. The transcribed results of all interviews can be found in Appendices D to H. (Note that citations do not appear in the preceding list of references.)

[2] Note, the here used term *hard infrastructure* is referred to grey infrastructures of CCA measures such as dykes and levees and not to Healey's [1997] notion of *hard infrastructure of planning systems* (cf. Sub-section 3.2.3)

Furthermore, you need to maintain the dyke and levee 'for ever', and there is little opportunity putting it down or to adapt to increasing risks once it is built [Fryd, 2020, App.H, 17:32].

More adaptive solutions such as nature-based solutions entailing a wide range of co-benefits having a higher degree of adaptivity and flexibility inherent. It takes the uncertainties of climate change impacts into account and leaves a higher possibility to adjust measures with ongoing changes in environmental scenarios [Vindum, 2020]. In Vejle's Storm Surge Strategy this flexibility is attained by setting up three phases of implementation that refer to the current state of assessment with regard to future climate change impacts of predicted sea level rises and heights of storm surges [Ibid.]. Vindum [2020] explains that the whole idea of having planning phases is 'to take one phase at a time [...] and work on it as [they] get more information: How much will the sea level rise? And how many storm situations? Are they increasing so much as [they] predict? [...] To build it in a way that [they] can make it higher along the way' [Ibid., App.D, 06:02].

Co-Benefits in Discourse

This paragraph addresses co-benefits not only as part of discourse but rather as a communication strategy. According to Vindum [2020], the negotiating process of Vejle's Storm Surge Strategy always takes 'the "added value" as an aspect into the discussion' [Ibid., App.D, 16:54]. Vindum [2020] sees potential in using co-benefits as a way of communicating, in particular, with the citizens since they are 'relevant to [their] daily life' [Ibid., App.D, 28:20]. She further explains that 'If you have improved air quality, or increased biodiversity, increased aesthetic value, you can relate to that in your daily life' [Ibid.]. In that way, you reach 'people at different levels and in many ways [...] and create a dialogue' that moves away from storm surge protection as this 'very technical and engineering-driven thing' [Olsen, 2020, App.G, 20:18]. Thus, it is about creating a personal relevance but also political legitimacy. To the latter Tiselius [2020] refers to that it is often not apparent how much a project will cost. In those situations, it is helpful to point at the co-benefits and the added value that such a project might entail [Tiselius, 2020]. That means using co-benefits as a negotiating and persuasion strategy, especially with the politicians since 'they will be the ones to decide to put money aside for doing [projects like the Storm Surge Strategy]' [Thorhauge, 2020, App.F, 15:44].

Legitimacy & Accountability

As touched upon in the previous paragraph, the potential of integrating co-benefits as a discourse strategy and way of communication is closely related to the potential of creating legitimacy and accountability among various stakeholders. Co-benefit driven approaches may create personal relevance and thus strengthen legitimacy but also accountability among communities. According to Thorhauge [2020], this creation of legitimacy and accountability among various stakeholders is crucial since, in future times, it may not only be the politicians to put money aside but also the citizens and the public sector. In other words, it is not only about creating an awareness about the importance of CCA but also to point out how the citizens may benefit from it in the near future in order to make it more relevant and legitimate to them [cf. Thorhauge, 2020, Vindum, 2020].

Social Inclusion & Justice

Legitimacy is closely related to social justice in the sense that 'legitimate political decisions are first and foremost decisions that meet the most basic requirements of [social] justice' [Hinsch, 2010, p.44]. By implementing CCA measures with 'added value [...] that gives something back to the city', it increases the potential of creating a more just and inclusive city that contributes with benefits for the whole community [Vindum 2020, 07:40]. This refers to the concept of social justice and social inclusion by creating 'a city for everyone' [cf. Olsen, 2020]. As touched

upon in *Flexibility & Adaptivity*, the 'levee paradox' addresses the risk of implementing 'hard infrastructure' such as levees and dykes that foster urban development in risk areas, increase long-term costs for maintenance and, thus, may expose future generation to an even higher risk [Fryd, 2020, App.H, 17:32].

This refers to a problematisation with regard to two different target groups of social justice: (1) the current citizens and (2) future generations of citizens. In this context, Olsen [2020] argues for the need to create spaces that are accessible for everyone and to refrain from creating residential areas that are only affordable for a small part of the population. Co-benefit oriented and nature-based solutions provide added value to a wide range of the population. This is achieved by, for instance, providing recreational areas, green spaces, and vegetation that benefit the health of all citizens. As aforementioned, social justice also needs to be regarded in a future perspective by addressing questions like 'How to adapt to climate change in a way that provides the flexibility and adaptivity that is needed in order to ensure legitimacy and justice for future generations?' [cf. Fryd, 2020].

Resilient Development

The discussion upon the potential of co-benefit approaches to foster resilient development is central to the whole study as anchored in the underlying Research Question: *Why do co-benefits of climate change adaptation measures matter, and how can they contribute to urban resilience, in the local context of Vejle?* This paragraph examines the connection between co-benefits and resilience, as addressed by the interviewees. As Fjordbyen is one of the priority projects of the Resilience Strategy (Analysis II, Section 8), the resilience vision is anchored in the development process of Vejle's Storm Surge Strategy (cf. Figure 8.1). The Resilience Strategy was 'used as a sort of guideline' [Tiselius, 2020, App.E, 14:35]. Tiselius claims that 'storm surge protection is all about being resilient' [Ibid.]. However, how exactly the co-benefit and added value-driven approach of the Storm Surge Strategy contribute to resilient development could not be answered in detail by the respondents. This is related to ambiguities or uncertainties of defining resilience though it seems to represent a big part of Vejle's identity [Tiselius 2020].

One relationship that was pointed out by Olsen [2020] and Fryd [2020] was the connection between the concept of co-benefits or added value and social resilience. It is closely related to the potential of co-benefits to foster social justice. Olsen [2020] claims that in many projects 'social resilience is not taken serious enough' [Ibid., App.G, 10:11]. Targeting cross-sectoral co-benefit approaches such as formulated in the Storm Surge Strategy may contribute to social resilience in the sense of providing urban spaces with a 'richness in different people, from different social layers' [Olsen, 2020, App.G, 20:18]. Fryd [2020] refers to Albris's [2019] definition of social resilience as a way to build adaptive capacity in local communities to be prepared for, to withstand and respond to, and to recover from disasters.[3] Comparing the two statements by Olsen [2020] and Fryd [2020] reveals the ambiguous understandings of social resilience.

9.2 Challenges of Integrating Adaptation Co-Benefits

Alongside the previously highlighted potentials, there were also a number of challenges of integrating CCA co-benefits that got emphasised during the course of the interviewing process. The following five themes turned out to be associated with the most relevant challenges: (1) differing preferences and weightings of co-benefits/added value by different stakeholders (com-

[3] Fryd's [2020] here stated statement to social resilience took a point of departure in an interview held May, 20^{th} (see Appendix H). However, the here cited part comes from a personal and written statement that was subsequently submitted to the interview via e-mail.

ing along with terminological ambiguities), (2) measuring co-benefits and their impact, (3) lack of experiences and uncertainties (coming along with missing frameworks and guidelines) and, last but not least, (4) governance structures and institutional barriers (5) influences of the local context. Where the latter point addresses issues such as local politics, economies, and their interests as well as local communities, their coherence, awareness, and vocality. These five major challenges of integrating CCA co-benefits into urban planning processes must not be seen as distinct but as potentially interrelated and intertwined in their impacts and consequences.

Preferences & Weighting of Co-Benefits

The interview responses revealed two distinct causes for differences in preferences and weighting of co-benefits: First, influences of the local conditions referring to very specific local environmental realities and identities but also infrastructural conditions, and, second, the interferences of personal interests of various stakeholders and their perspectives on different environmental, social and economic co-benefits.

According to Vindum [2020], 'added value is depending on where you are' [Ibid., App.D, 10:11]. By claiming that she refers to 'where' as a local scale that may even be narrowed down to a neighbourhood scale. Thus, the understanding of added value varies within the city. This is influenced by the characteristics inherent to particular places. Vindum [2020] states that along the waterfront the added value may be possibilities to touch the water, to go fishing and, as a consequence, to provide public spaces that make these activities possible and preserve Fjordbyen's identity as 'the city part that meets the water' [Tiselius, 2020, App.E, 15:16]. In the Western part of the city, in turn, the focus might lie on increasing green spaces since it is mainly built in concrete. In this context, Thorhauge [2020] refers to an overlaying problem of how to find out what 'added value' represents for a certain area or neighbourhood with its particular socio-environmental composition. Vejle Municipality is trying to bring together 'people living in Vejle, architects, and artists to get ideas [...] what "merværdi" might be' [Thorhauge, 2020, App.F, 13:42]. Thus, the determination of co-benefits or 'added value' is interfered by socio-political questions such as 'for whom is the city created' [cf. Olsen, 2020].

While the previous paragraph addressed the influence of specific areal environmental and infrastructural conditions and identities, this paragraph touches upon a second challenge related to local preferences and weightings of co-benefits: personal interests and motivations of different stakeholders. In this context, Vindum [2020] refers to the differing perspectives and needs among stakeholders by giving an example of negations with the owner of the industrial harbour. While both Vejle Municipality and the owner of the industrial harbour need to safeguard the city and the harbour, respectively, from getting flooded Vejle Municipality also wants to satisfy the citizens' needs by, for instance, increasing public accessibility of the harbour front. For the owner of the harbour *hard infrastructure*, here understood as grey CCA solutions built in concrete, such as walls, might be more economically reasonable. For other stakeholders such as investors and landowners, it might be more profitable to implement new real estate. There are a lot of people that want to live in the harbour areas and can afford to pay the high apartment prices [Vindum, Olsen, 2020, Apps.D, H]. According to Vindum [2020], differentiation in interests and needs requires negotiations, which become more complex if CCA measures taking cross-sectoral considerations into account. Thus, it entails negotiations that include social questions, environmental uncertainties and, in the end, big economic issues. And the weighting of co-benefits within these sectors varies depending on the variations of the stakeholders' interests and needs.

Measuring Adaptation Co-Benefits

The previous challenge of varying preferences and weighting of co-benefits is interfered by an-

other obstacle: the difficulty of measuring co-benefits. According to Olsen [2020], this problem has been addressed by various people (e.g. scholars). However, nobody has found a solution yet. Olsen [2020] explains this challenge is related to the previous one in a sense that different co-benefits are weighted differently by different stakeholders, and, as a consequence, a consistent framework for measuring co-benefits is difficult to set up. These discussions can quickly question like 'How do you evaluate life?' in a sense that a co-benefit that may be an actual benefit for one person is not necessarily positive for another one [Olsen, 2020, App.G, 19:15].

The temporal dimension plays a big role when looking at the challenge of measuring co-benefits. Fryd [2020] takes up these considerations by explaining the problem of setting up a framework if you have interfering 'static and dynamic processes' where he refers to the 'division between built infrastructure in traditional civil engineering [...] and more nature-based solutions' [Fryd, 2020, App.H, 09:30] [cf. Fryd and Jørgensen, 2020, p.9]. As touched upon in Analysis II, different environmental, social, and economic co-benefits may unfold their impacts differently over time, in particular with more dynamic nature-based solutions. Thus, if there were indicators able to measure co-benefits, their value would most likely alter over time while simultaneously having net-impacts on other co-benefits (cf. Section 8.1).

Uncertainties & Lack of Experiences

There are, in particular, two different kinds of uncertainties interfering: (1) future climate impacts and (2) implementation process of co-benefit oriented CCA measures. This comes along with questions like 'How much will the sea level rise?' and 'How many storm surge situations are to expect?' that requires adaptive and flexible solutions [Vindum, 2020, App.D, 06:02]. Thus, more dynamic solutions are required that have a high degree of flexibility and adaptive capacity inherent but may entail uncertainties about their impacts and safety factors [cf. Fryd, 2020, Olsen, 2020].

These uncertainties are interrelated with the challenge of measuring the impact of co-benefits but also with a lack of experience in the field of more co-benefit oriented approaches [Olsen, 2020]. According to Tiselius [2020], some sort of experience or 'best practices', is essential in order to dare something new but also in order to get the political support that is needed when pursuing a strategy that is subject to such high degree of uncertainty [Tiselius, 2020, Olsen, 2020]. However, even with best practices it is sometimes difficult to convince politicians and investors since it is difficult to put a sum of money on a project or to estimate the economic value if there is uncertainty about what 'the something' is that is given 'back to the city' with regard to environmental, social and economic co-benefits [cf. Vindum, 2020, Olsen, 2020].

Vejle certainly benefits from best practices, projects that were initially subject to a high degree of uncertainty and that, eventually, paid back their investment with a wide range of added value [Tiselius, 2020]. There is a great impact of the Resilience Strategy on Vejle's urban development. In the beginning, the Resilience Strategy was something new, something experimental. However, within four years, it has evolved to a vision that is highly established and embedded in Vejle's identity [Tiselius, 2020]. According to Olsen [2020], the Resilience Strategy has contributed with a 'common understanding', a 'common vocabulary' that has been essential in the negotiating process of Vejle's Storm Surge Strategy with politicians. Olsen [2020] says, 'You couldn't just start with this. They would never agree. Because there would be too many uncertainties.' [Ibid., App.G, 24:42]

Governance Structures & Institutional Barriers

One of the major challenges is manifested governance structures, and institutional barriers that go hand in hand with a lack of frameworks or guidelines that inform the municipalities of how to implements integrated co-benefit approaches [cf. Fryd, 2020]. In particular, cross-

sectoral and multi-disciplinary strategies are often interfered by local politics and economic interests. According to Fryd [2020] these interferences could be contained by providing top-down guidelines at state level and would facilitate the implementation process. Also, Vindum [2020] states that there is no defined framework they worked with for implementing Vejle's Storm Surge Strategy. Even if the Resilience Strategy might have been a 'jumping board for a lot of sustainable work' [Olsen, 2020, App.H, 26:36] there has not been 'any particular sort of legal or decided connections between the Storm Surge Strategy and the Resilience Strategy' [Tiselius, 2020, App.E, 15:16].

These integrated strategies that pursue cross-sectoral co-benefit approaches require people from multi-disciplinary backgrounds to work together [Thorhauge, 2020, Olsen, 2020]. According to Olsen [2020], 'you need to be a big team of people to drive a project like that' (Vejle's Storm Surge Strategy) [Ibid., App.G, 38:20]. Co-benefit driven CCA measures involve a range of decisions in different fields, and it is crucial that everyone is updated to avoid making decisions that are detrimental with the overall development vision of the city [Thorhauge, 2020]. Olsen [2020] emphasises further that 'it's a lo of wheels' and it is the next step to look what 'all these wheels' are Vejle Municipality needs to turn [Ibid., App.G, 13:48].

'Wheels turning' requires collaboration, and co-creation needs communication. Olsen [2010] explains that in order to bring forward such a project like the Storm Surge Strategy, boundaries need to be pushed and questions like 'How do we do co-creation internally in the Kommune?' [Ibid., App.G, 40:44]. In other words, that means to reconsider and restructure ways of working and collaborating in order to increase their reasonableness and operability (institutional capacity). Olsen [2020] emphasises, 'there are so many people who know so many things', but they are used to work differently, more individually and isolated [Ibid., App.G, 40:44]. Most of these people have been working in Vejle Municipality for years, and their routines of working in a less collaborative manner have been deeply rooted in their daily practices [Olsen, 2020].

Adaptation to & Influence of Local Context

The challenge of adapting strategies, actions, and measures to the local context is to a lesser or greater degree embedded in all of the previous four challenges discussed. In particular, preferences, experiences, and governance structures of urban planning systems are influenced by the local context composed by local political, social, and economic conditions and dispositions. In other words, it is about (1) the preexisting conditions that facilitate the implementation of new ideas such as co-benefit approaches and (2) the very particular local conditions that require a context-specific adaptation of these approaches [cf. Fryd, 2020].

As aforementioned, one of these preexisting advantages was the Resilience Strategy that was acknowledged as a 'jumping board for a lot of sustainable work' [Olsen, 2020, App.G, 26:36]. This may entail another advantage of having a certain degree of experience in working cross-sectorally and cross-disciplinarily, which is, in turn, mutually influenced by governance structures and institutional processes (see previous paragraph). Furthermore, Vejle is part of Realdania's protect 'Cities and the rising seawater' (Byerne og det stigende havvand) that financed the development process around Vejle's Storm Surge Strategy and thus has fostered and facilitated the set up of events regarding, for instance, citizen involvement [Realdania, 2020, Tiselius, 2020]. Fryd [2020] argues that there are great disparities between the different municipalities in Denmark. There is a range of local influence factors on the implementation process of adaptation strategies and measures as, for instance, 'the size of the municipality, the wealth of the municipality, how vocal the residents are' affecting, in turn, 'processes of negotiating, responsibilities, cost distribution and so on' [Fryd, 2020, App.H, 26:03].

9.3 Summary

As part of the research design, this analysis has been carried out with the intention of applying the conceptual framework of Institutional Analysis (Sub-section 3.2.3) to the results generated from the interview data. Whereas Analysis I and Analysis II can be regarded as examinations in the area of *soft and hard infrastructure*, respectively, Analysis III refers to their interdependencies and combining effects. (According to Healey [1997], the combined forces of *hard and soft infrastructure* are crucial in order to develop institutional capacity that fosters adaptive capacity development and enables strategy-making activities of CCA that can give an effective response to climate change.) This concluding summary of Analysis III takes up the potentials and challenges of integrating co-benefits in the local context of Vejle and examining their impact on the *hard infrastructure of planning systems* and the *soft infrastructure of planning practices*. Thus, the following argumentation will take up theoretical considerations on the notion of *hard and soft infrastructure* and analyse in their context the resulting challenges and potentials of integrating co-benefits into the governance and urban planning processes of Vejle's Storm Surge Strategy.

In the following, it is referred to Table 3.3[4] characterising Healey's [1997] *hard and soft infrastructure* based on Scott's [2013] seven dimensions of institutional characteristics: (1) basis of compliance, (2) basis of order, (3) mechanisms, (4) logic, (5) indicators, (6) affect, and (7) basis of legitimacy (Sub-section 3.2.3). These dimensions and the respective characteristics of *hard and soft infrastructure* are examined regarding the potentials of integrating co-benefits and, second, the challenges of integrating co-benefits into the planning process of Vejle's Storm Surge Strategy as pointed out in Sections 9.1 and 9.2.

Table 4.3: The *hard infrastructure and the soft* infrastructure defined by Healey [1997] and characterised based on Scott's [2013] seven dimensions of institutional characteristics (cf. Table 3.2).

	Hard Infrastructure	**Soft Infrastructure**
Basis of compliance	Expedience	Social accountability
	Social obligation	Social inclusion
Basis of order	Formal institutions	Formal and informal institutions
	Policy systems	Shared identity
	Planning systems	Local consensus
Mechanisms	Coercive/Empiric	Empiric/Innovative
Logic	Functionality	Implementation
	Efficiency	Adaptation
Indicators	(Legal) Rules	Relation-building
	Rights	Social collaboration
	Duties	Social invention
Affect	Habitualness, Persistence/ Uncertainty	Curiosity/Reluctance
Basis of legitimacy	Social structuring	Inclusionary

[4]For convenience only, Table 3.3 - originally displayed in Section 3.2 - has been inserted here again (see below).

Potentials of Integrating Adaptation Co-Benefits

In the course of Analysis III, the following five potentials of integrating CCA co-benefits were emphasised by the interviewees: (1) flexibility and adaptivity, (2) co-benefits in discourse and communication, (3) legitimacy and accountability, (4) social inclusion and justice, and (5) resilient development. During the analysis process, it has become evident that the individual potentials must not be seen as distinct but possibly interrelated and intertwined in their impacts and consequences.

Looking at the potentials of integrating adaptation co-benefits it becomes apparent that a couple of them can be identified among the institutional characteristics of Scott's [2013] seven dimensions applied to Healey's [1997] 'soft infrastructure of planning practices' (Table 3.3). The potentials of *flexibility and adaptivity* can be identified in and may contribute to the fundamental logic of soft infrastructure that addresses implementation and adaptation of, for instance, strategies based on *innovative* as well as *empiric* mechanisms. Referring back to Ribeiro and Pena Jardim Gonçalves's [2019] definition of *innovative* as a characteristic describing the 'ability to quickly find different ways to achieve goals or meet their needs' when an urban system is under shock or stress [Ibid., p.7] (cf. Sub-section 3.2.2) it may be argued that *being flexible and adaptive* are attributes inherent in *innovation*. However, effective *adaptation* requires *empiric* knowledge it may build on. The analysis of *co-benefit in discourse and communication* addresses potentials of shared identity and *local consensus* but also *social collaboration* and, thus, are rooted in the *basis of order* and *indicators* of 'soft infrastructure'. Furthermore, the potentials of contributing to *legitimacy and accountability*, as well as social inclusion and justice, can be found in the *basis of compliance* and *basis of legitimacy* of soft infrastructure characterised by social accountability and *social inclusion*.

Challenges of Integrating Adaptation Co-Benefits

Alongside five potentials also five major challenges were pointed out in the course of Analysis III: (1) preferences and weighting of co-benefits, (2) measuring adaptation co-benefits, (3) uncertainties and lack of experiences, (4) governance structures and institutional barriers, and (5) influences of and adaptation to the local context. As for the potentials also for the challenges interrelations, among each other are apparent.

The aforementioned challenges of integrating co-benefits into planning processes are either manifested in *hard infrastructures of planning systems* or challenge soft infrastructure of planning practices. The *preferences and weighting of co-benefits*, for instance, interfere with the *basis of compliance* of *hard infrastructure* to comply with social obligations. Yet, this raises the fundamental question of 'social obligations to whom' and, thus, may challenge 'soft infrastructure of planning practices' with regard to finding a *local consensus* in an inclusive manner. This refers to Peters and Pierre's [2008] 'essence of governance' lying in the pursuit of interests in a collective manner through means of 'collective objectives and goals' [Ibid., p.242]. The challenges of *uncertainties and lack of experiences* and *governance structures and institutional barriers* are closely related in the sense that uncertainties may impede *curiosity* and *social invention* and foster *habitualness* and *persistence* of *governance structures and institutional barriers*. However, the *logic* of *functionality* and *efficiency* of *hard infrastructures of planning systems* may be challenged and questioned by new approaches such as co-benefit driven CCA. *Adaptation to local context* requires among others to consider local *rules*, *rights*, *duties* but also to create a *shared identity* and *local consensus* that represents the prerequisite essence of adapting to.

IV | Discussion

This last part of the study consists of three chapters: First, Chapter 10 discusses the Research Design (Part II) and the results of Analyses I, II, and II (Part III), second, Chapter 11 sets out the overall contribution of the thesis and, last but not least, Chapter 12 outlines directions for future research. The latter chapter arises out of (1) the research limitations pointed out in the first chapter and (2) builds on findings and results as discussed in the second chapter of this part.

Chapter 10

Discussion

The aim of this chapter to meet the following two objectives: (1) to discuss the underlying research design and associated methodological considerations about concerning limitations and interrelated reflections upon reliability and validity (Section 10.1), and (2) the discussion of the results of the Analyses I, II, and II addressing the local perception of CCA and liveability (Section 10.2), the conceptualisation of CCA co-benefits in Vejle's Storm Surge Strategy and Resilience Strategy (Section 10.3), and the potentials and challenges of integrating co-benefits into urban planning processes (Section 10.4) in the local context of Vejle.

The discussion of the results involves their interpretation concerning their meaning and relevance. Therefore, the main research findings of Analyses I, II, and III (Chapters 7, 8, and 9) will be explained and evaluated based on the underlying conceptual framework (Section 3.2). While the limitations section will reflect the question of what the results cannot reveal, the discussion of Analyses I, II, and III will reflect upon why the results matter. To this end, it discusses the results in light of the introductory problem analysis of this study (Chapter 2) and reveals new understandings and insight that emerged out of the analyses.

10.1 Limitations

As aforementioned, this section discusses the limitations of the research design, including theoretical and methodological considerations (Part II). By doing so, it reflects upon aspects of reliability (replicability of results) and validity (integrity of results) of Analyses I, II, and III. Validity describes the integrity of conclusions drawn from a research analysis [Farthing, 2016, Lewis-Beck et al., 2004]. The here addressed validity is of internal character and examines if causal explanations can be trusted [cf. Swanborn, 2010]. (In contrast to 'external validity' which deals with the degree of generalisability [Ibid.] (cf. Section 3.3).) Since 'validity presumes reliability', a piece of research can only be valid if the data from which conclusions are drawn are reliable [Bryman, 2012, p.173]. These aspects of research quality are determined by

illuminating obstacles that are either related to the research design or have been encountered during the research process. The following two sub-sections illuminate these obstacles with regard to (1) limitations that emerged related to the use of methods (*methodical limitations*) and (2) limitations concerning the overall research design (*methodological limitations*).

Methodical Limitations

Methodical limitations that are inherent in the used methods were already touched upon in Chapter 5. However, a couple of additional obstacles related to the application of the methods emerged during the research process. One of these obstacles was related to the distribution of the web-based survey. Since its target group was limited on citizens of Vejle the survey was mainly posted on group pages of the social network Facebook that aim at addressing issues concerning the citizens of Vejle solely. Unfortunately, the Facebook group with the most members and citizens of Vejle states a prohibition of publishing surveys in it terms of use. As a consequence, it was highly difficult to get a sample size of responses that would ensure the reliability and validity of the conclusions drawn in Analysis I (Chapter 7). In the end, from 197 people that opened the link to the survey only 19% completed all survey questions, and 11% completed the survey partly (Figure F). Even if Bryman [2012] argues that the decision about the sample size depends on a number of considerations. He also claims that 'the bigger the sample, the more representative it is likely to be' [Ibid., p.198]. One of these considerations can be the heterogeneity of the respondents in order to obtain a representative image of a variety of different perspectives that may be influenced by characteristics such as age, gender, and social status (Figure E). Another source of falsification concerns the fact that internet users could actively choose to participate or not participate in the online survey. Since I gave a short introduction to the field of research, the participation may be biased with a preexisting interest in the survey topic. Last but not least, even if the survey was addressed to citizens of Vejle there is a small probability that some of the respondents might have lied about this requirement and do not live in Vejle.

Regarding the document analyses in the framework of Analysis II the following discussion refers to Bowen's [2009] three main limitations of documents that may influence the reliability of the data generated and the validity of the conclusions drawn upon them. These limitations include (1) insufficient detail, (2) low retrievability, and (3) biased selectivity (see Section 5.2). Referring to Vejle's Storm Surge Strategy and its Resilience Strategy, both documents are not produced for research and may lack sufficient information. In addition, the current Storm Surge Strategy solely represents a preliminary version and lacks detailed information on, for instance, measures and solutions, as it has been touched upon several times. Furthermore, the Storm Surge Strategy (Stormflodsstrategi) is formulated in Danish and potential ambiguities coming along with the translation from the original language to English must be born in mind. In addition, the strategies may instead emphasise positive sides of development and best practices, so rather potentials than challenges [Farthing, 2016]. In the context of this analysis, biased selectivity is related to the formulation of the subordinate questions II.a) and II.b), or in a broader sense, rooted in the choice of a case study design. This relates to the problem that 'researchers conceptualise the documents from which they generate data in different ways, and this will influence the way they frame their research questions and go about generating their data' [Farthing, 2016, p.138]. (The reversed situation can also be the case.) Sub-question II is formulated as *How are co-benefits of climate change adaptation measures conceptualised, in the local context of Vejle?*. Answering this question based on two document analysis may raise issues of replicability. However, since the focus of this study is on Vejle's Storm Surge Strategy

additional analyses of other climate adaptation strategies, plans or projects would have gone beyond the scope of this research work.

As touched upon in Section 5.4, due to the time-consuming nature of semi-structured interviews, it is often argued that the sample size is insufficient to ensure reliability and validity of the collected data. According to Adams [2015], this drawback can be bypassed if only members of a small group or organisation are interviewed such as those members of Vejle Municipality being involved in the planning process of the Storm Surge Strategy. However, as revealed in the course of this analysis even a narrow focus on one singular urban strategy leads to a unit of analysis that goes beyond one organisation and addresses several institutional aspects (cf. Figure 4.6). In other words, the planning process involves much more perspectives than the ones that were pointed out based on the six interviews conducted in this study (Appendices D to I). The challenge of defining a representative sample size of interviews and, thus, perspectives, insights, thought and opinions go parallel with planning processes that transgress multiple disciplinary boundaries involving various stakeholders (such as the one of Vejle's Storm Surge Strategy). In other words, a valid answer to the question of *potentials and challenges of integrating co-benefits of climate change adaptation* would require an analysis based on a comprehensive conduct of interviews with multiple stakeholders involved in the planning process. Here, it is essential to mention the time perspective related to the challenge of a representative sample size. Not only due to the inherent time-consuming nature of semi-structured but, in particular, with regard to ongoing planning processes that might shift perspectives, create knowledge and change approaches over time and, thus, may impact the interviewees' responses. However, these long-term perspectives are impossible to grasp in the scope of the present study undertaken within four months of research.

Furthermore, many of the contact persons who have been requested for an interview either (1) did not respond to sent e-mails or calls or (2) did not have the time to participate in an interview. In addition, for those who had the time and were willing to participate in an interview were coping - like all of us - with the circumstances around COVID-19. These circumstances have influenced the ongoing planning processes that came along with new ways of working, the shift from analogue to digital events, the postponements of workshop etc.. These changes and uncertainties were reflected in the responses of the interviewees. In this context, the semi-structured nature of the interviews entailed the advantage of creating a dynamic and flexible interview process that left scope for follow-up responses and open-ended questions that addresses these changes and uncertainties.

Methodological Limitations

As pointed out in Section 3.1, the underlying philosophical considerations take up ontological and epistemological stands of post-positivism, social constructivism, and pragmatism. That implies a view on the world as socially constructed where knowledge is part of ongoing constructions. A pragmatic worldview 'arises out of actions, situations, and consequences rather than antecedent conditions' [Creswell, 2014, p.10] that argues for a research strategy of mixed methods as pursued in this study. As argued in Section 3.1, in a pragmatic worldview translating epistemological considerations into a methodological framework entails some challenges [Kaushik and Walsh, 2019]. Even though most pragmatists assume independence of methods [Kaushik and Walsh, 2019]. I argue that caution should be exercised when drawing conclusions on results of applied methods that have revealed differing degrees and natures of reliability and validity. In other words, if conclusions are drawn upon causal implications between different results of analyses the reliability and validity of each method will have a cascading effect on the

overall result. Furthermore, the results of one method may influence the following application of other methods. This is meant in a sense that the result of one method may entail a bias towards the research direction and, thus, influence the use of methods in further analyses towards a certain anticipated research outcome. A concern related to Thompson's [1997] view that the 'contextual, problem-centered character of pragmatism limits its ability to identify and analyze structural problems' [Ibid., p.426]. She claims that the interrogation of social, political and cultural conditions requires an unbiased stand must not take its point of departure in problem-centred approaches but should be 'grounded in politicized experience' [Thompson, 1997, p.425].

Not only fundamental ontological and epistemological limitations should be born in mind but also, limitations with regard to the conceptual framework (Section 3.2) need to be considered. One major limitation is the focus on co-benefits instead of co-impacts. The adverse or negative effects of CCA actions and measures have not been considered in this research work. The analysis of 'disbenefits, co-cost, risks, or adverse side effects' would have gone beyond the scope of this study [Ürge-Vorsatz et al., 2014, p.552]. However, it is essential to be aware that 'sustainable development considerations including economic, social and environmental net benefits' need also address potential adverse net-effects of CCA policies as well as potential trade-off between different co-benefits [Floater et al., 2016, p.15]. A couple of trade-off considerations have been touched upon in Analysis III by pointing out conflicts of interest with concerning the different economic, environmental, and social co-benefits. However, more in-depth analysis with regard to challenges of multiple objectives with regard to co-benefits and adverse side effects as well as among different stakeholders has not been carried out.

Furthermore, setting up a consistent *Framework of Urban Resilience* (Section 3.2.2) turned out to be complicated. As introduced in Section 1.2, the term 'urban resilience' comes along with conceptual vagueness influenced by the complexity of social-ecological systems and the impact of context dependence on the operationalisation of urban resilience [Windle, 2011, Brunetta et al., 2019]. In the local context of Vejle the focus lay on its Resilience Strategy orienting towards the City Resilience Framework (CRF) as introduced by 100RC. The setting up of the *Framework of Urban Resilience* took a point of departure in CRF and the *even characteristics of resilient urban systems* (also introduced by 100RC). Though a critical reflection upon the CRF and an expansion of the seven characteristics (see Figure 3.4) was carried out wider considerations of other existing frameworks did not take place. Thus, conclusions drawn on the main Research Question (see following Chapter 11) regarding *co-benefits contribution to the resilience of coastal communities* must be seen with regard to the very context-dependent understanding and significance of urban resilience.

10.2 Perception of Climate Change Adaptation & Liveability

This section discusses the results of Analysis I, as summarised in Section 7.3. This will be done by critically reflect them through the theoretical lenses of the conceptual framework of institutional design based on Healey's [1997] notion of *hard and soft infrastructure*, Scott's and its interpretation through the lenses of [2013] 'Three Pillars of Institutions' (Figure 3.5, Table 3.3). The aim is to evaluate to what extend the local perception of climate change adaptation and liveability influences the adaptive capacity and the development of institutional capacity understood as the effective alignment of institutional settings comprising regulative, normative, and cultural-cognitive social practices (cf. Sub-section 3.2.3).

Applying Healey's [1997] understanding of *soft infrastructure* implies to look at 'practices for developing and maintaining particular strategies in specific places' (whereas *hard infrastructure* refers to the 'rules and resources of policy systems') [Ibid., p.6]. That includes looking at attributes like shared identity, local consensus, social collaboration, social accountability, and inclusion, among others (Figure 3.5). The survey results do not allow reasonable discussions of all aspects but give an insight into some of the local normative and cultural-cognitive perspectives on CCA. As pointed out in Section 7.3, most of the respondents perceive the importance of CCA with *very high*. The majority of those who consider CCA a vital topic also show great interest in the topic. Thus, there is a shared cultural-cognitive understanding and a shared logic of the importance of action apparent (cf. Scott's [2013] 'Three Pillars of Institutions' as described in Table 3.2). Yet, the survey results show that only a few of the respondents know about any CCA measures or projects in Vejle and even fewer have already expressed any suggestions or concerns to the Municipality. Conclusions derived from Section 7.3 point out different potential causes for the divergence between perceived importance and interest, on the one hand, and knowledge and action, on the other hand. One explanation might be an imbalance between the citizen's initiative to inform themselves (which is influenced by factors such as prioritising other established practices [cf. Rodden and Wibbels, 2019, pp. 18-22]) and the establishment of mechanisms that enable access to information [Hattke and Kalucza, 2019]. Even if further analysis of this aspect would go beyond the scope of this study, touching upon it plays into the second part of Analysis I: the citizens' evaluation of *criteria of liveability* of their living and social environment.

Two of the higher-rated criteria are *A city that actively involves its citizens in climate issues* and *A city that takes active action in safeguarding its citizens from climate change*. These criteria are preceded by environmental characteristics such as *good air quality* and *green spaces* and *an environment that benefits the citizens' health*. Less importance did the respondents ascribe to economic criteria such as *Economic growth and development of the city* or *Innovation and investment*. In general, the evaluation of the criteria is relatively evenly distributed, and their assigned significance lies close to each other. Thus, according to the respondents, it is not one criterion alone that predominantly influences the liveability and, in turn, the quality of their living environment but a selection of different environmental, social, and economic aspects. Here, the interconnection and interdependencies between the criteria were not further analysed. Out of a normative perspective, these criteria may be understood as social obligations and binding expectations based on a local consensus and shared identity.

10.3 Conceptualisation of Co-Benefits in Strategic Planning

Analysis II as undertaken in Chapter 8 (1) examined the conceptualisation of CCA co-benefits in Vejle's Storm Surge Strategy and (2) revealed the role of these co-benefits in connection with Vejle's Resilience Strategy. The aim lay in unfolding sub-question II: *How are co-benefits of climate change adaptation measures conceptualised, in the local context of Vejle?*. In order to be able to reflect upon this question, it is useful to have a closer look at the semantic meaning of the term *conceptualisation*. Here, I refer to Teller et al.'s [2007] definition of *conceptualisation* as 'an abstract, simplified view of the world that has to be representing for some purpose' and that 'determine[s] the universe of discourse that is to say the objects, concepts, and the relationships that hold among them' [Ibid., p.143]. Teller et al. [2007] further itemise the *specification of conceptualisation* as the attempt in representing this conceptualisation in a way that entails a common understanding of its form and meaning. This may be, for instance, an 'agreed-upon

vocabulary and semantic structure' enabling the exchange of information in a certain domain [Ibid., p.144]. By taking up this interpretation of the *(specification of) conceptualisation* sub-question II refers to the specification of a simplified and purposeful construct through which co-benefits of CCA are represented in order to create a common understanding.

As revealed by Analysis II, *added value* (merværdi) represents one of the central concepts in Vejle's Storm Surge Strategy (Stormflodsstrategi). Thus, added value may be seen as a part of a discourse and a specification of co-benefits conceptualisation as an 'agreed-upon vocabulary' aiming at creating a common understanding [Teller et al., 2007, p.144]. Looking at the Storm Surge Strategy through the lenses of the conceptual framework of co-benefits examined this conceptualisation to determine the objects and their purpose and relationships inherent in the discourse of *added value*. As stated in Vejle Kommune [2020b], the overall objective of added value is to provide something more than security (storm flood protection) to the city and its citizens. This 'something more' (noget mere) is a vague expression that initially leaves a large scope for interpretation. First, 'something more' for the city and the citizens may be regarded as neutral and value-free. Second, 'something more' may be interpreted in various ways by different stakeholders. In the course of document analysis of Vejle's Storm Surge Strategy, the valued understanding of 'something more', as stated in the Strategy has been examined and can be summarised as followed:

> 'Added value to storm surge adaptation is the endeavour of creating 'something more' to Vejle City and its citizens expanding beyond the safeguarding from flooding. This 'something more' is primarily formulated as environmental and social co-benefits entailed by nature-based solutions bringing about positive environmental impact, recreational value, and improved health conditions. Added value is inherent to sustainable climate change adaptation that, in turn, is a prerequisite for resilient urban development.
> [based on Vejle Kommune, 2020b]

Referring back to the touched upon characteristics of 'something more' as value-free and dependent on the perspective of respective stakeholders raises the question of its economic nature. Though not conceptualised in the discourse of added value 'economic growth while simultaneously reducing flood risks' is one of the major underlying paradigms pursued by Vejle Municipality and formulated in its Resilience Strategy [Vejle Kommune et al., 2016, p.31]. In this context, flood reduction measures need to be designed in a way that 'encourage[s] investment, development and real estate value' [Ibid.]. These economic co-benefits introduce an integrated policy approach of aligning the Storm Surge Strategy with a wide range of other strategies and plans and, in particular, with Vejle's Resilience Strategy, which represents the city's vision of resilient urban development [Vejle Kommune, 2020b, p.26]. This integrated policy approach refers to the taxonomy of co-benefits concerning their intentionality (Sub-section 3.2.1). It may be argued that the environmental, social, and economic co-benefits are intentionally sought not only as secondary objectives but as arising among several simultaneous objectives coordinated between different strategies and plans [cf. Vejle Kommune, 2020b, p.26]. In this context, the document analyses revealed a high overlap between the co-benefits pointed out in the Storm Surge Strategy and resilience objectives as stated in Vejle's Resilience Strategy. There, a strong focus lies in promoting health and wellbeing of the community and as already touched upon before in promoting economic growth.

As part of the conceptual framework of co-benefits their taxonomy includes besides *intentionality* two other dimensions: *scope* and *scale*. Here, the scope of co-benefits refers to the three aspects of (1) stimulating action CCA, (2) 'generating of climate adaptation goods and services,

and (3) 'advancing sustainable development' as defined by IPCC [2014c]. In this context, it is argued that the co-benefits pointed out in Vejle's Storm Surge Strategy may stimulate action on CCA by addressing their practicability of covering multiple urban development objectives, and that, in turn, may lead to saving financial resources and represent a good argument for politicians and other stakeholders to bring forward CCA actions [cf. Bain et al., 2015]. However, at this point, it is reasonable to argue that this may require a high degree of administrative effort coming along with the need for extra budget and potential institutional restructuring, as argued in the further course of this chapter. In the context of Vejle's Storm Surge Strategy a steering committee has been set up coordinating the alignment of the different objectives, strategies and plans [Vejle Kommune, 2020b, p.26].

It has been argued that the second dimension of 'generating of climate adaptation goods and services' is difficult to assess since the final solution catalogue of concrete storm surge adaptation measures is not yet developed. However, referring to 'climate adaptation goods and services' in a broad meaning as among others new technological solutions, risk assessment, trends, economic analysis and advice on best practices [IPCC, 2014c, European Commission, 2020], some of these adaptation good and services may arise out of Vejle's ambitions to 'design flood defences to encourage investment [and] development' and to 'enable Vejle to become an innovation laboratory for resilience' [Vejle Kommune et al., 2016]. Yet, these a rather long-term consideration that may be difficult to assess in the early development status of Vejle's Storm Surge Strategy.

The third aspect of scope related to 'advancing sustainable development' refers to the aforementioned intentionality of an integrated policy approach where co-benefits become simultaneously integrated with other urban development objectives. As touched upon before, the contribution of the Storm Surge Strategy to Vejle's resilience visions is central. Thus, it may be argued that the intentionality of co-benefits manifested in an integrated policy approach inevitably aims at advancing resilient development since it represents the underlying paradigm in the local context of Vejle. To what extent the resilient development is related to sustainable development is part of a broader discussion that would go beyond the scope of this research study [cf. Marchese et al., 2018].

Last but not least, the impact assessment of co-benefits requires spatial and temporal considerations of scale. Such an assessment is often difficult to carry out since it requires methods that take 'the changing dynamics of the [urban] system at a variety of [...] scales' into account [Raymond et al., 2017, p.21]. The complexity is inherent in urban systems characterised by the interplay of environmental, social and economic aspects challenges, in particular, the temporal dimension of the multiple co-benefits of different CCA measures. The 'scale challenge' requires to be translated into a quantitative decision-support framework that enables to measure the diverse impacts of CCA co-benefits of respect measures [cf. Ürge-Vorsatz et al., 2014]. These are general obstacles that occur context-independent. In the case of Vejle's Storm Surge Strategy even a rough estimate of spatial and temporal impacts is unfeasible, at present, since this would require an overview of concrete storm surge adaptation measures and actions that is expected to be released in a solution catalogue in the end of 2021.

10.4 Integrating of Co-Benefits into Urban Planning Processes

This Sub-section discusses the results of Analysis III that was carried out in Chapter 9 and examined (1) the potentials and (2) the challenges of integrating co-benefits into planning processes in the context of Vejle's Storm Surge Strategy. It aimed at giving a reasonable

answer to Sub-question III: *What are the potentials and challenges of integrating co-benefits of climate change adaptation into the planning process of Vejle's Storm Surge Strategy?*.

Figure 10.1 represents the analytical framework for concluding remarks on the integration of co-benefits into urban planning processes through the theoretical lenses of Institutional Analysis. This is done by taking up the results of Analysis III summarised in Section 9.3 to analyse how the challenges and potentials that affect the *hard and soft infrastructure* have an impact on the development of institutional and adaptive capacity which means to be capable 'to interrelate the concerns of the different [...] communities which co-exist in a place' [Healey, 1997, p.310] while being able 'to respond successfully to climate variability and change [...] [including] adjustments in both behaviour and in resources' [Adger et al., 2007, p.727].

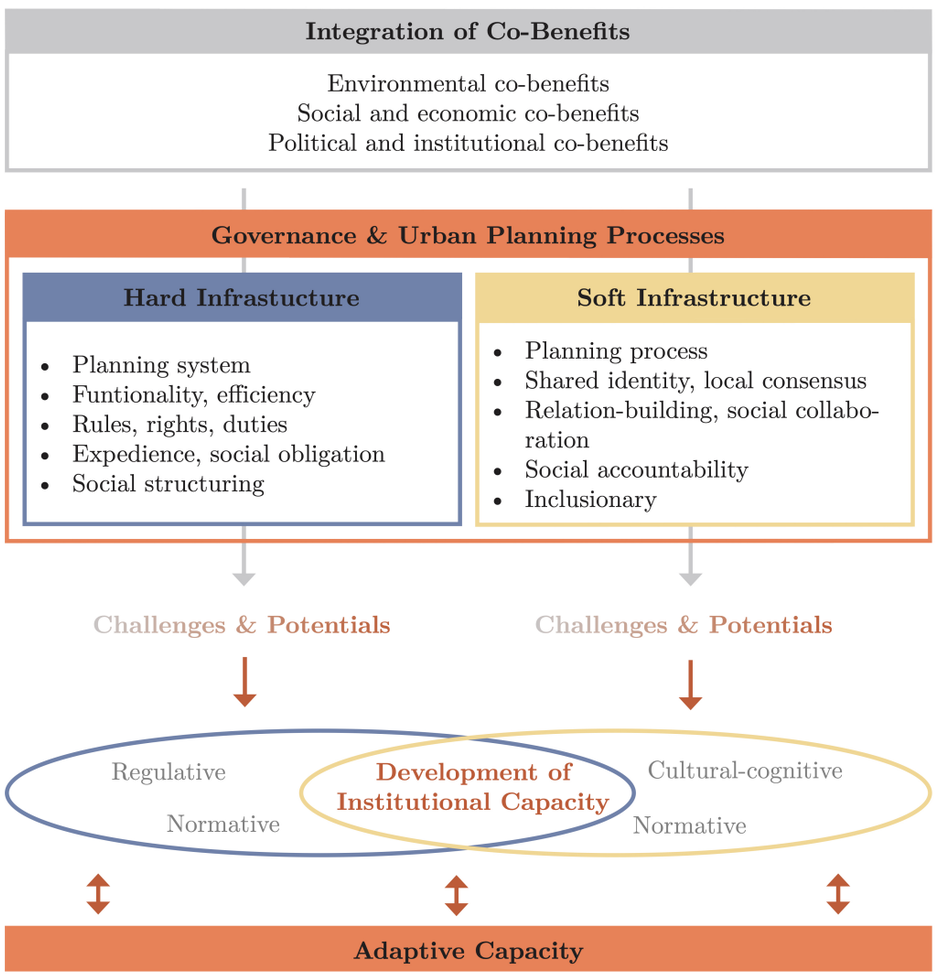

Figure 10.1: Analytical framework of Analysis III the integration of co-benefits of climate change adaptation into urban planning processes through the theoretical lenses of Institutional Analysis.

Analysis III of six interviews revealed five potentials and five challenges of integrating co-benefits into the planning process in the context of Vejle's Storm Surge Strategy:

Potentials:

- Flexibility and adaptivity
- Co-benefits in discourse
- Legitimacy and accountability
- Social inclusion and justice
- Resilient development

Challenges:

- Preferences and weighting of co-benefits
- Measuring adaptation co-benefits
- Uncertainties and lack of experiences
- Governance structures and institutional barriers
- Adaptation to the local context

As can be concluded from Section 9.3 that the pointed out potentials and challenges represent either an opportunity for 're-designing the soft infrastructure of planning practice' in a way that potentially fosters the development of institutional capacity or a constraint that impede effective alignment of 'hard and soft infrastructure' [Healey, 1997, p.313]. This impediment lies, in particular, in the challenge of breaking up the reinforcement of uncertainties, lack of experiences and lack of comprehensive frameworks as well as the habitualness and routine of governance structures and planning systems (*hard infrastructure*). In other words, the uncertainties and lack of experience coming along with co-benefit approaches require *curious* and *innovative soft infrastructure of planning practices* that would open up 'abilit[ies] to quickly find different ways to achieve goals or meet their needs' [Ribeiro and Pena Jardim Gonçalves, 2019, p.7] but are often inhibited by the persistence of institutional barriers.

However, in the case of Vejle and the context of its Storm Surge Strategy and Resilient Strategy these challenges seem to be slowly turned into potentials of integrating co-benefits into planning practices and, in turn, developing institutional capacity. The uncertainties and lack of experiences coming along with co-benefit approaches are overcome by a set of advantageous initial conditions, including experiences in cross-sectoral urban planning that provides an impetus for 'striking out in new directions'. This prerequisite of experiences with *forward-looking* and *innovative* pathways got emphasised by Olsen [2020] as follows, 'You couldn't just start with this [Vejle's Storm Surge Strategy]. They would never agreed. Because there would be too many uncertainties [Ibid., App.G, 24:42].' Furthermore, Vejle is part of Realdania's project 'Cities and the rising seawater' (Byerne og det stigende havvand) that financed the development process around Vejle's Storm Surge Strategy and thus has fostered and facilitated the set up of events regarding citizen involvement among others [Realdania, 2020, Tiselius, 2020].

Back to the question of 'how challenges are turned into potentials' in the local context of Vejle: Besides a fortunate influence of prior experiences - in particular with regard to Vejle's Resilience Strategy - the planning processes around the Storm Surge Strategy and its inherent co-benefit focus challenges the persistence of governance structures and opens up opportunities for more *inclusive* and *collaborative soft infrastructure of planning practices* (cf. Table 3.3). This potential is particularly related to the integration of CCA co-benefits into discourse and communication by adding 'the "added value" as an aspect into the discussion' [Vindum, App.D, 16:54]. Communicating cross-sectoral co-benefits of CCA may raise interest in the topic due to their relevance for different stakeholders and immediacy in the citizens' daily lives. This, in turn, may contribute to social legitimacy and justice and, last but not least, social inclusions. In other words, by implementing CCA measures with added value benefiting the whole community increases the potential of creating a more just and inclusive city.

In conclusion, the development of Vejle's Storm Surge Strategy has benefited from an initial state of experiences, but also financial resources, and that is what has facilitated the integration of a co-benefit driven conceptualisation or has made it even possible. According to Olsen [2020], these prior experiences, the established 'resilience vocabulary' and common understanding that has arisen out of the Resilience Strategy was crucial to convincing politicians and stakeholders of the Storm Surge Strategy. 'You couldn't just start with this. They would have never agree. [...] [T]here would be too many uncertainties' [Ibid., App.G, 24:42]. However, bringing through the proposal of the Strategy was only an initial obstacle. Despite the fortunate conditions, the implementation of the Storm Surge Strategy and, thus, co-benefit driven coastal adaptation based on mainly nature-based solution remains 'very much an experiment' that 'need[s] very brave people' [Olsen, App.G, 20:18]. Eventually, the Strategy promises to provide more just and inclusive solutions, to foster the better alignment of the *hard infrastructure of planning systems* and the *soft infrastructure of planning practices*. That may entail wide-ranging cross-sectoral

benefits by providing 'the city and its citizens with something more than security [storm surge protection]' and developing institutional capacities that expand beyond climate-adaptive ones. [Vejle Kommune, 2020b, p.34].

Chapter 11

Conclusion

This chapter aims at taking up the previous discussion on Analyses I, II, and III by correlating and contextualising the partial outcomes and to conclude with the main overall research findings which, eventually, lead to an answer to the leading Research Question:

> *Why do co-benefits of coastal adaptation matter and how can they contribute to the resilience of coastal communities?*

Analysis I, II, III (Part III) unfolded three sub-questions concerning (I) the local perception of CCA and liveability, (II) the conceptualisation of co-benefits in Vejle's Storm Surge Strategy and related to the Resilience Strategy, and (III) the potentials and challenges of integrating co-benefits into the planning process of Vejle's Storm Surge Strategy and related to the Resilience Strategy. The three sub-questions (analyses) were set up after an argument for *Vejle as a case* was brought forth (Chapter 4) and analysed specific elements of the leading Research Question concerning (1) the significance of co-benefits of coastal adaptation and (2) their contribution to the resilience of coastal communities.

According to Healey [1997], '[s]trategy-making activity which "makes a difference" and transforms what happens [...] involves social processes through which new shared convictions are generated [Ibid., p.268]'. Thereby, she refers to the notion of *soft infrastructure* which, together with *hard infrastructure* (referring to the rules and resources of planning systems), has been applied throughout the analyses of this study. Healey [1997] further specifies that 'strategic-making efforts' need to 'set in motion processes through which to review and reflect upon existing ideas and organising routines and to generate new ones which are widely owned among the relevant stakeholders [..] and need to grow out of the specific concerns of stakeholders' [Ibid., p.268]. (The question of *who is relevant* will be subliminally and inevitably touched upon throughout this chapter.)

The integration of coastal-adaptation co-benefits into Vejle's Storm Surge Strategy promises to initiate theses reflection processes of ideas and routines 'to generate new ones which are widely owned among stakeholders' [Healey, 1997, p.268]. In this context, Analysis I revealed the significance of CCA co-benefits in the sense that there is (1) awareness for the broader cross-sectoral impacts of climate change (among Vejle's citizens) that go beyond the environmental pillar and (2) perceived importance of CCA that consequently must respond to these wide-ranging environmental, social, and economic impacts. That is mirrored by the vision of Vejle's Storm Surge Strategy to develop a resilient district at Vejle Fjord where storm surge adaptation with 'added value' and sustainable CCA goes hand in hand [Vejle Kommune, 2020b]. 'Added value' is understood as providing 'something more ' (noget mere) than safeguarding the city from flooding and, thus, expanding beyond the sole climate benefit of flood risk reduction. If 'added value' aimed to increase the city's liveability it should, according to Vejle's citizens, span a range of criteria focusing on environmental and social benefits such as green spaces and health benefits. These co-benefits of nature-based adaptation measures bear significance due to their relevance

to all communities. Contributing to the liveability of a city may be understood as the *basis of compliance* of the normative institutional pillar addressing the social obligations and binding expectations of *hard infrastructure of planning systems* [Scott, 2013, Healey, 1997]. Beyond that, the integration of co-benefits into urban strategies may come along with several other potentials for the 'soft infrastructure of planning processes' such as flexibility and adaptivity to adapt to the variability of climate risks but also to be capable 'to interrelate the concerns of the different [...] communities which co-exist in a place' [Healey, 1997, p.310]. That, in turn, increases the legitimacy, social justice, and inclusion of CCA measures by means of creating 'a city for everyone' [cf. Olsen, 2020]. Providing legitimacy plays an important role in the negotiating process with politicians and stakeholders and may further strengthen the accountability for CCA measures by integrating cross-sectoral co-benefits.

If these cross-sectoral co-benefits are intentionally sought arising among several simultaneous objectives in an integrated policy approach [Floater et al., 2016], they may provide an opportunity of contributing to the ongoing urban development and foster resilient ambitions. Referring to the *eight characteristics of urban resilient systems* implies a co-benefit approach that is reflective, resourceful, inclusive, integrated, robust, redundant, flexible, and innovative (Sub-section 3.2.2). Looking back at the aforementioned potentials of integrating CCA co-benefits the majority of the eight characteristics become apparent as inherent in flexibility and adaptivity, legitimacy, social justice, and inclusion. Furthermore, urban resilience may be understood as a concept that includes the ability to acquire new capabilities and to transform urban systems beyond reactive, recovery, and adaptive capacities [Wong-Parodi et al., 2015, Olazabal et al., 2012, Walker et al., 2004]. In that respect, it can be argued that there lies potential in CCA co-benefits for re-designing the *soft infrastructure of planning practices* in a way that contributes not only to the development of adaptive but also institutional capacity and, thus, to resilient development.

However, the planning process of Vejle's Storm Surge Strategy has benefited from a number of advantageous initial conditions the largest of which is its embedding in Vejle's Resilience Strategy. Despite the lack of a guideline of *how to translate the Resilience Strategy into other local planning strategies*, the Resilience Strategy provided Vejle with a 'resilience vocabulary', that has been crucial in the negotiating process with politicians and stakeholders [Olsen, 2020, App.G]. This common understanding and resilience thinking has become part of Vejle's identity and an 'agreed-upon vocabulary' facilitating planning practices. Beyond that, the implementation of the Resilience Strategy has inevitably led to experiences in cross-sectoral planning and best practice examples that balanced the uncertainties and the lack of comprehensive frameworks to implement co-benefit-driven CCA measures in the local context of Vejle. This leads to the key conclusion on the question of *how co-benefits of adaptation can contribute to the resilience of communities*: It requires an integrated policy approach that aligns the expected co-benefits - in a simultaneous manner - with the different environmental, social, and economic objectives of the ongoing urban development informed by resilience-thinking. This 'resilience-thinking' must be defined as 'shared objectives and metrics that would help to capture a resilience dividend, prevent trade-offs to the extent possible and provide 'a resilience opportunity to create resilience value for a range of stakeholders' [Ruibal and Van der Leeden, 2016].

Chapter 12

Future Research

This chapter takes up the limitations and obstacles that have been pointed out and discussed in the previous two chapters. It points towards directions of potential future research with regard to (1) overcoming present methodological limitations and (2) building on the main research findings of this study.

In this context, it is essential to emphasise one more time the early planning stage of Vejle's Storm Surge Strategy (Stormflodsstrategi). As mentioned in Section 4, a proposal of the Strategy was published in February 2020. The launching of the strategy was intended to be followed by a dialogue phase with stakeholders and citizens in the period from February to September [Vejle Kommune, 2020a]. This phase had to be extended since several public hearing events had to be postponed due to the COVID-19 situation. The input that is expected to be gained during these events is supposed to be taken into account when preparing the solution catalogue for concrete coastal adaptation measures in 2021. As a consequence, future research might have a look at the design and implementation phase of co-benefit-driven adaptation measures to follow up on the examination of potentials and challenges of integrating co-benefits into planning processes (cf. Analysis III).

That requires to critically reflect on the notion of co-benefits concerning an alternative approach of co-impacts including the consideration of 'disbenefits, co-costs, risk, or adverse side' [Ürge-Vorsatz et al., 2014, p.552] and uncovering synergies and trade-offs (cf. Section 10.1). That implies to look at interdependencies and net-effects of different cross-sectoral co-impacts but also other objectives of urban development that may reveal positive as well as adverse side-effects. This leads to obstacles of assessing co-benefits (co-impacts) associated with difficulties of setting up frameworks that address the uncertainties of co-benefit impacts and take 'the changing dynamics of the [urban] system at a variety of geographic and temporal scales' into account [Raymond et al., 2017, p.21]. Future research should not only focus on methodological and theoretical ways of assessing climate co-benefits [cf. Ürge-Vorsatz et al., 2014], but also focus on the real-life context taking the very local conditions and influence parameters into account. In other words, it needs tools and indicator to assess co-benefits of CCA measures [cf. CLARITY, 2019], that become integrated into frameworks that take the context-specific evaluation and significance of co-benefit impacts into account. Context-dependent interrelations and interdependencies of co-benefits require 'multiple-objective/multi-impact framework[s] rather than [...] single-purpose co-benefit one[s]' [Ürge-Vorsatz et al., 2014, p.551].

The implementation of such frameworks requires a high degree of administrative coordination that needs to come along with an institutional re-design in favour of governance structures that facilitate an integrated policy approach. That requires to reflect upon structural forces, conflicts of interests, and path-dependencies. Thus, future research may focus further on the institutional barriers and lock-ins that impede considerations of co-benefit-driven adaptation. In other words, it may examine questions like: *Why do co-benefit approaches often do not appear on the discourse agenda concerning CCA alternatives?* and *How to break up positive feedback*

loops impeding the integration of integrated co-benefit approaches?.

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Appendices

Appendix A: Survey Questions

(1) Do you live in Vejle?

- ❑ Yes
- ❑ No

(If 'yes' was checked, participant could continue with the questionnaire.)

(2) Which of the following climate change impacts affect you personally the most?
Please, rate the impacts on a scale from O=not affected at all to 5=highly affected.

Heat waves

❑ ❑ ❑ ❑ ❑ ❑

0 1 2 3 4 5

0=no at all affected 5=highly affected

Increased rainfall intensity and frequency

❑ ❑ ❑ ❑ ❑ ❑

0 1 2 3 4 5

0=no at all affected 5=highly affected

Flooding caused by heavy rainfall

❑ ❑ ❑ ❑ ❑ ❑

0 1 2 3 4 5

0=no at all affected 5=highly affected

Coastal flooding

❑ ❑ ❑ ❑ ❑ ❑

0 1 2 3 4 5

0=no at all affected 5=highly affected

Sea level rise

❑ ❑ ❑ ❑ ❑ ❑

0 1 2 3 4 5

0=no at all affected 5=highly affected

Health impacts

❑ ❑ ❑ ❑ ❑ ❑

0 1 2 3 4 5

0=no at all affected 5=highly affected

Economic impacts

❑ ❑ ❑ ❑ ❑ ❑

0 1 2 3 4 5

0=no at all affected 5=highly affected

(3) How do you rate your interest in climate change adaptation on a scale from 0=not at all interested to 5=very interested?

❑ ❑ ❑ ❑ ❑ ❑

0 1 2 3 4 5

0=no at all interested 5=very interested

(4) How important do you think climate change adaptation is on a scale from 0=not at all important to 5=very important?

❑ ❑ ❑ ❑ ❑ ❑

0 1 2 3 4 5

0=no at all important 5=very important

(5) Who carries responsibility for initiating a response to the impacts of climate change? *(Multiple selection possible.)*

- ❑ State government
- ❑ Regional government
- ❑ Municipal government
- ❑ Citizens
- ❑ Private sector
- ❑ Academic institutions
- ❑ Research institutions
- ❑ Local NGOs
- ❑ National NGOs
- ❑ Grassroots citizen initiative
- ❑ Other_____

(6) Do you know any climate change adaptation measure or project that your city initiated?

If yes, please enter one in the text box.

- ❑ Yes
- ❑ No

(7) Which criteria of liveability should the environment of your place of residence meet? Please, rate the following environmental, social and economic benefits on a scale from O=not at all important to 5=very important.

Good air quality

❑	❑	❑	❑	❑	❑
0	1	2	3	4	5

0=no at all important 5=very important

Good water quality, collection, and security

❑	❑	❑	❑	❑	❑
0	1	2	3	4	5

0=no at all important 5=very important

Vegetation, biodiversity, and green spaces

❑	❑	❑	❑	❑	❑
0	1	2	3	4	5

0=no at all important 5=very important

An environment that benefits your health

❑	❑	❑	❑	❑	❑
0	1	2	3	4	5

0=no at all important 5=very important

Good access to public spaces

❑	❑	❑	❑	❑	❑
0	1	2	3	4	5

0=no at all important 5=very important

Aesthetic value of the city

❑	❑	❑	❑	❑	❑
0	1	2	3	4	5

0=no at all important 5=very important

Good community cohesion

❑ ❑ ❑ ❑ ❑ ❑

0 1 2 3 4 5

0=no at all important 5=very important

Employment and income generation

❑ ❑ ❑ ❑ ❑ ❑

0 1 2 3 4 5

0=no at all important 5=very important

Innovation and investment

❑ ❑ ❑ ❑ ❑ ❑

0 1 2 3 4 5

0=no at all important 5=very important

Economic growth and development of the city

❑ ❑ ❑ ❑ ❑ ❑

0 1 2 3 4 5

0=no at all important 5=very important

A climate-proof place of residence with minimised risk of climate change impacts

❑ ❑ ❑ ❑ ❑ ❑

0 1 2 3 4 5

0=no at all important 5=very important

A city that takes active action in safeguarding its citizens from climate change

❑ ❑ ❑ ❑ ❑ ❑

0 1 2 3 4 5

0=no at all important 5=very important

A city that actively involves its citizens in climate issues

❑ ❑ ❑ ❑ ❑ ❑

0 1 2 3 4 5

0=no at all important 5=very important

(8) Have you ever expressed any concerns or suggestions on urban issues to the city council? If yes, please state how.

❑ Yes

❑ No

(9) What is your age?

(10) What is your gender?

- ❑ Female
- ❑ Male
- ❑ Other

(11) What is your occupation?

- ❑ Employed
- ❑ Unemployed
- ❑ Student
- ❑ Self-employed
- ❑ A-kasse
- ❑ Retired

(12) Where did you find the link to the survey?

- ❑ Facebook
- ❑ Friends
- ❑ Other_____

Appendix B: Survey Results

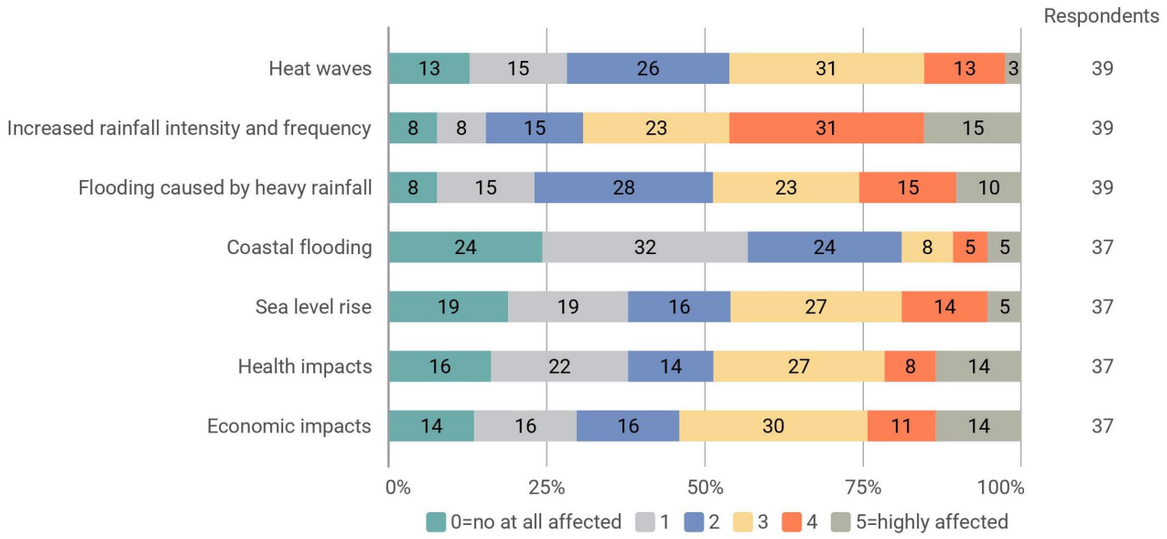

Figure A: How climate change impacts personally affect the citizens of Vejle.

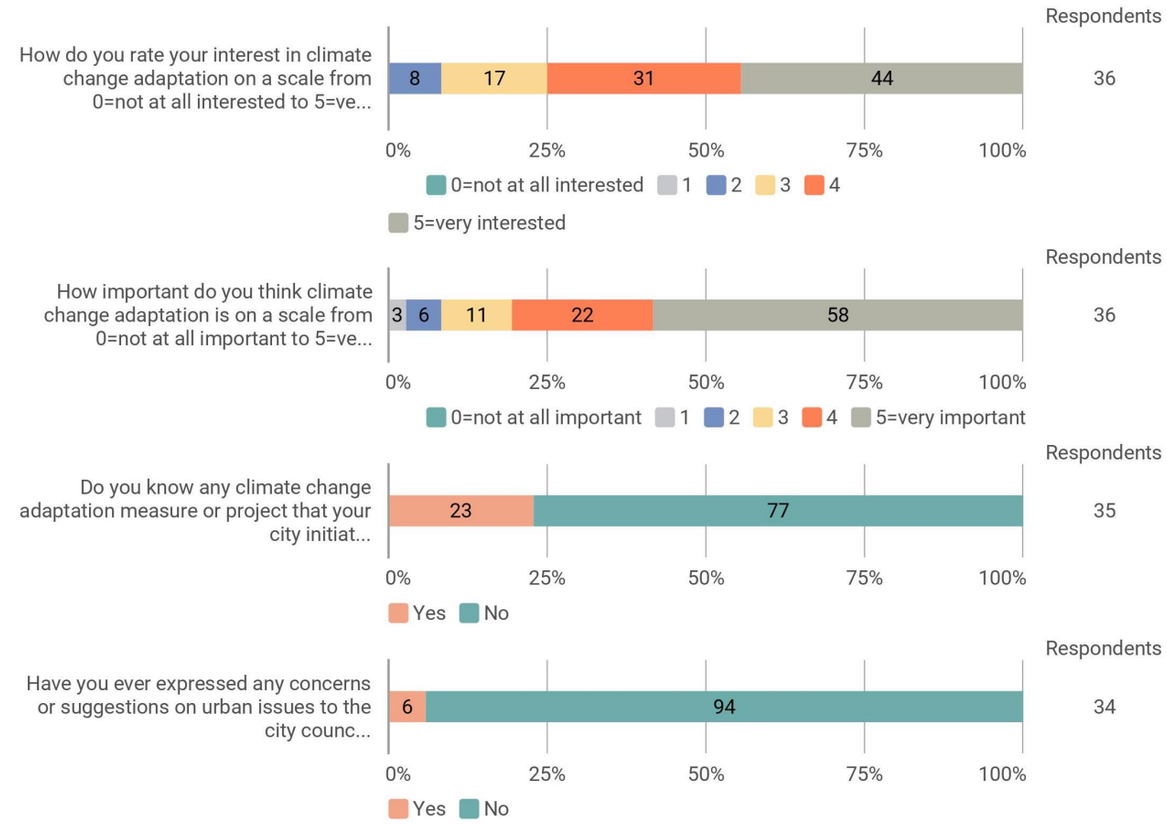

Figure B: Interest, rate of importance and awareness of Vejle's citizens in climate change adaptation.

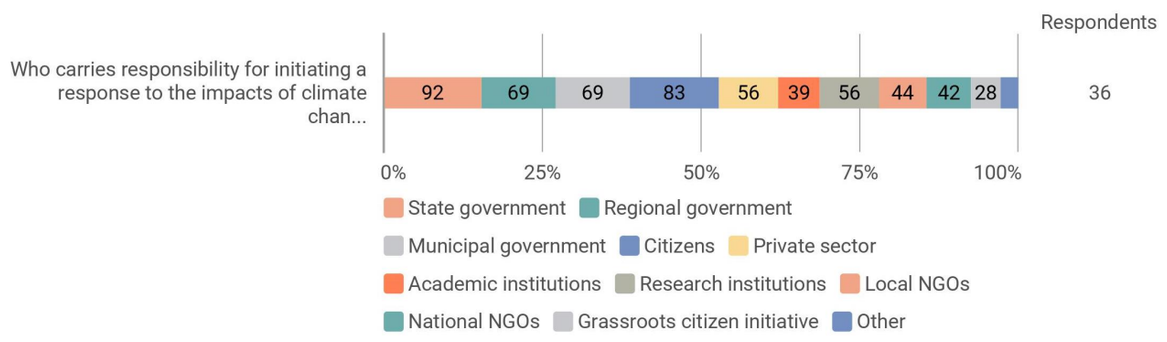

Figure C: Ascribed responsibility for initiating response to the impacts of climate change.

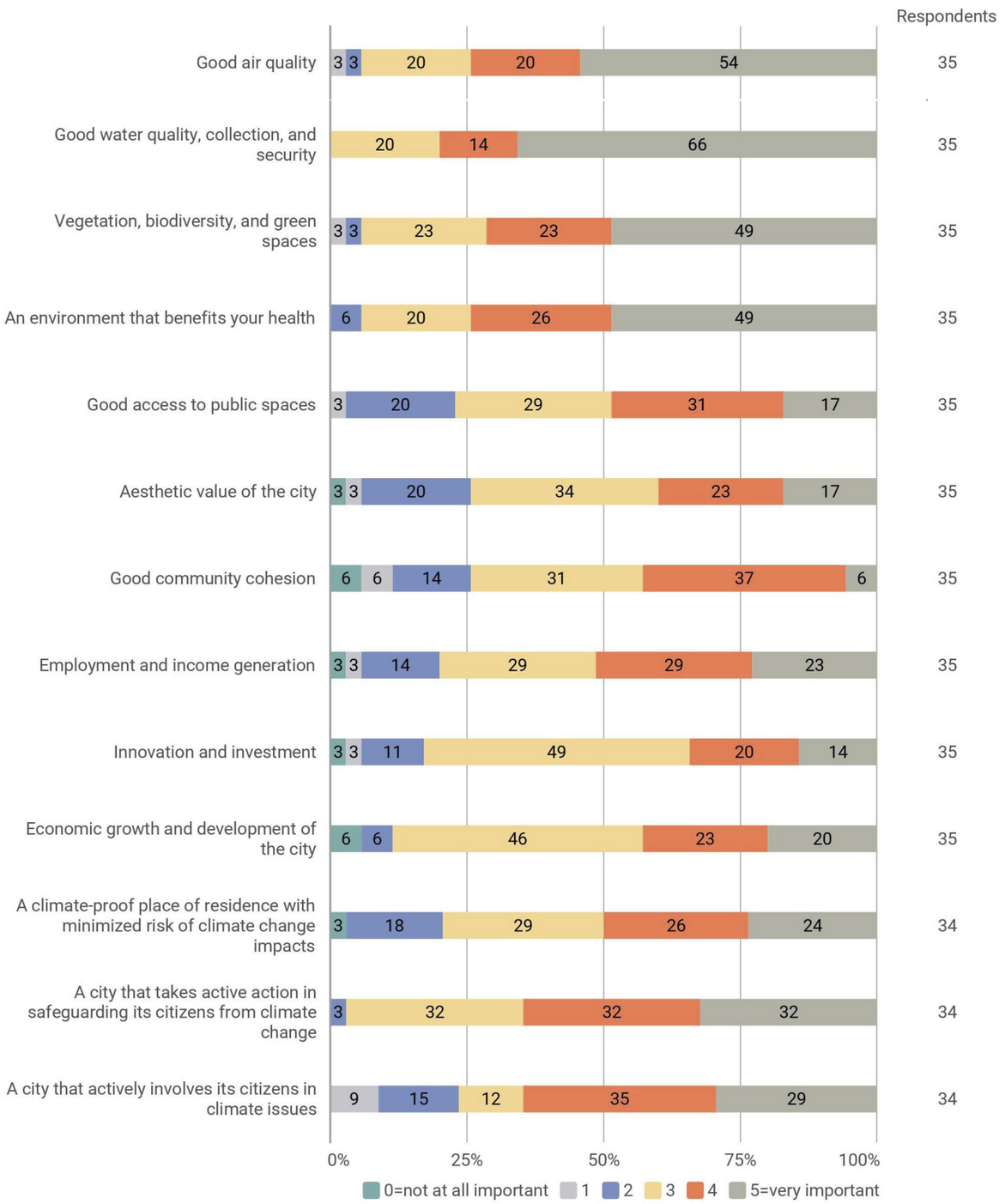

Figure D: Criteria of liveability of living and social environment according to citizens.

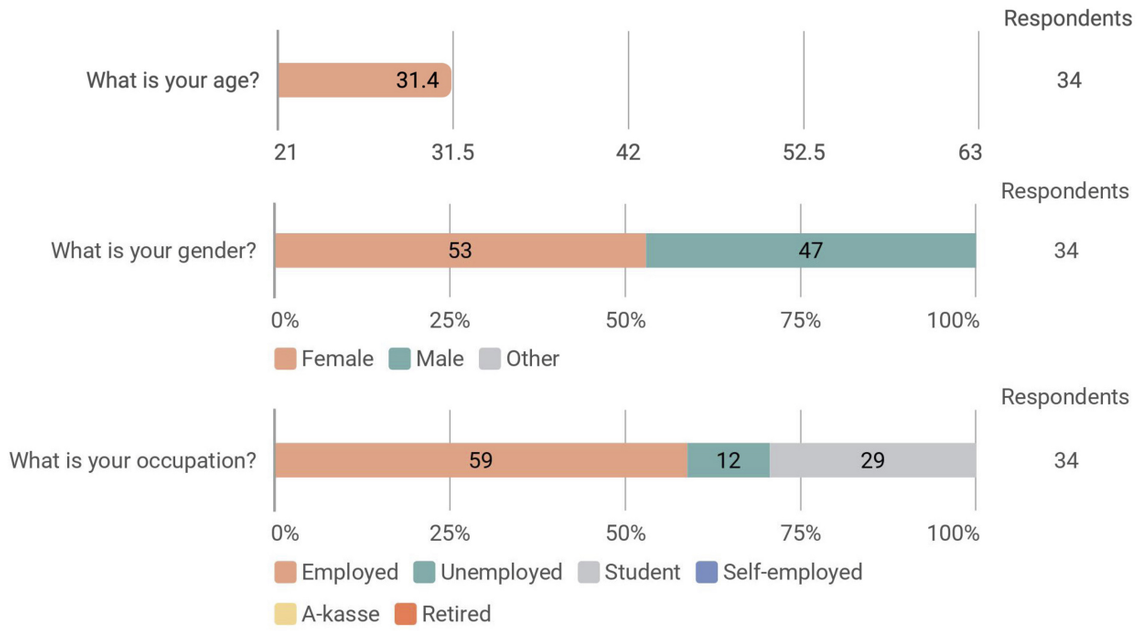

Figure E: Personal information on respondents (average age, gender, and occupation.

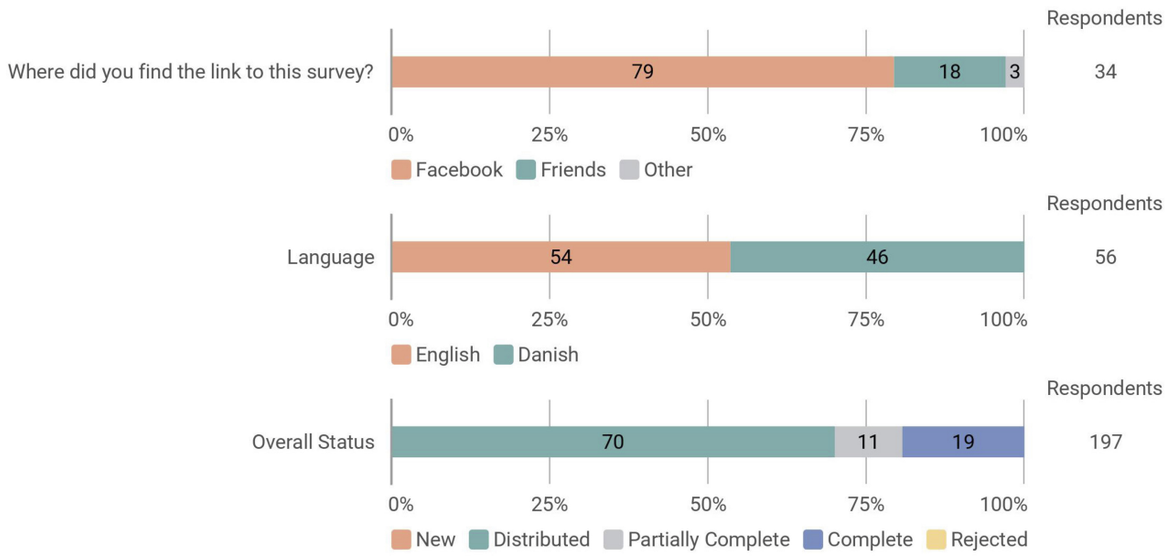

Figure F: Overall status of survey.

Appendix C: Interview Guides

Interview Guide C.1: Interviewees at Vejle Municipality

(1) In which department or position do you work in the municipality?

(2) How did your involvement in Vejle's Stormflodsstrategy look like? What is your role in the whole planning process?

(3) What is the overall objective of the Stormflodsstrategi?

(4) 'Added value' (merværdi) seems to be a central theme of the Stormflodsstrategi.

   a) How is this term understood in the context of the Stormflodsstrategi?
   In advance to the strategy's formulation in 2019, citizens of Vejle were invited to take a stand to come up with ideas for what they connect with 'added value' when talking about a future climate-resilient Vejle.

   b) What was their responses? And, how did you integrate them?

   The Stormflosstrategi is one of the lighthouse projects of Vejle's Resilience Strategy.

(5) How does the Resilience Strategy informs the Stormflodsstrategi? Or, in other words which elements out of the Resilience Strategy are incorporated in the Stormflodsstrategi?

   The concept of co-benefits of climate change adaptation means to go beyond sole climate benefits of adaptation measures.

(6) How does the Stormflodsstrategi integrates co-benefits?

(7) What potentials do you see in co-benefit approaches?

(8) How can co-benefit concepts facilitate collaborative planning? And, what challenges do you see in the process of actor and stakeholder engagement?

Questions on Urban Adaptation Measure Cards (UAMC)

On the front page (a) you can see a short technical description of the action, facts of the planning phase, addressed hazard(s) as well as a short explanation of provided climate benefits. If you turn the UAMC around and look at the back page (B) you can see a list of small icons representing a selection of 14 environmental (green), social (red) and economic (blue) co-benefits. (Their explanation can be found in the legend attached.) To the right you can find the 17 Sustainable Development Goals (SDGs).

I. Please check whether the co-benefit is addressed / is not addressed / you are uncertain.

II. Please estimate whether the action creates opportunities or risks concerning the 17 SDGs.

Note: Two examples of UAMCs addressing actions as pointed out in the Storm Surge Strategy (cf. card example in Figure G) were provided to the interviewees prior to the actual interview meeting. As stated in Sub-section 5.4, the initial intend of using the UAMCs in the framework of workshops and focus groups could not be pursued further, due to the circumstances around COVID-19. Remote interaction with UAMCs turned out to be fairly complicated and a valuable integration into the interview process hard to carry out. For this reason the participants'

feedback on co-benefits got not integrated in the analyses of the research questions. However, questions and respective responses related to the UAMC were kept in the study in order to open up for later discussions and considerations on potential future research.

Questions:

(9) Was the provided information of the UAMC comprehensive?

a) If not, please tell me what was unclear or confusing.

(10) What importance do you ascribe the SDGs in the context of the Stormflodsstrategi?

(11) At which state in the development process of the Stormflodsstrategi do you see the most potential for the use of the UAMCs?

a) Who would be the potential target group/users?

Figure G: Example of an Urban Adaptation Measure Card contextualised for one out of 16 adaptation actions stated in Vejle's Storm Surge Strategy; Nature-based recreational path along the river Sønder Å (Sønder Å-stien: Jordigge med rekreativ sti).

Interview Guide C.2: Ole Fryd from University of Copenhagen

(1) You were together with Gertrud Jørgensen the editors for the status report 2019 of Realdania's project 'Cities and the rising sea water' (Byerne og det stigende) which involves Vejle and its Storm Surge Strategy as one of eight pilot projects.

   a) May you tell me a little bit more about the project and the report?

   a) What is the objective and scope of the project and the report?

(2) One chapter represents a 'summary of professional notes' (Resumé af faglige notarer).

   a) What was the content and objective of this contribution?

   a) You also contributed together with Gertrud Jørgensen. What was your research exactly about?

(3) Another chapter summarises the 'status of practice in Denmark' (Status på praksis i Danmark). There eight major issues pointed out.

   a) One paragraph addresses the different approaches of Danish municipalities to response to climate risks. How do these differences look like?

   a) Another paragraph says that there is little experience in adaptation. It addresses the shift of employee position from e.g. 'coastal protection' to 'climate adaptation'. Why is that a problem?

(4) Back to my study focus on adaptation co-benefits. Vejle's Storm Surge Strategy describes it in its contexts as 'storm surge protection that brings something more to the city and its citizens'.

   a) How do you understand a co-benefit approach in this regard?

   a) What do you think are the patentials and also the challenges of cross-sectoral considerations?

(5) Last but not least, chapter 5 in the status report provides a proposal for a framework for the analysis and development of coastal projects in an urban context. May you tell something about how this framework looks like?

Note: In the following transcriptions of interviews, the remarks in square brackets are inserted by the author of this study. They represent either comments for the purpose of (1) clarification or in order to indicate (2) confusion or missing parts that were impossible to be reconstructed. Round brackets either indicate short comments or responses of one of the participants of the conversation or short interruptions.

Appendix D: Interview with Jette Vindum

Interview held on April, 20^{th} 2020 via online video conference.

Anna Eggert = (AE); Jette Vindum = (JV)

Information on the interviewee:
Jette Vindum is project developer in the department of Technical Affairs & Environment, Vejle Municipality.

00:00 (AE): I started to look a little bit more into the connection between the Sustainable Development Goals, co-Benefits concept. And, there are also some interesting [approaches] of how to combine these added value, co-benefit approaches with urban resilience. That is my focus. Still, [in the context] of the Storm Surge Strategy but in a broader sense, [means to zoom out] and look how at how the Storm Surge Strategy and the Resilience Strategy are connected. I prepared a few questions: First of all, which department is it where the Storm Surge Strategy is being developed? Are there different departments involved, or is the focus on one department?

01:31 (JV): Yes, the project is anchored in my department called strategic development department which is under the city architect and climate [...]. We are the ones defining the strategy, writing it. Then, we have input from all the other departments. But it's the development department that is producing the strategy.

02:10 (AE): The focus on it [the Storm Surge Strategy] will always be in this department?

02:15 (JV): *(Problems with the internet connection)*

03:38 (AE): The question was only if the focus [with regard to the Storm Surge Strategy] will be shifted to another department. Or, will the main attention be always giving in the strategic development department?

03:51 (JV): I think the main attention on the Stormflodsstrategi will stay in our development department. But, of course after the final [formulation] of the strategy we will make a catalog of solutions, concrete solutions: What are we going to do, and what do we expect when we're done?...during the next ten years. And, these will have tighter connections to the department that are actually building and managing the harbour area. So, the people that make the plans will have to take this into account. And, the people building new areas in the harbour will have to take this into account, the people taking care of the sewage systems. So, the next step is this solution catalog, and that will be more specific, and that will be more [specifically] allocated to the other department. But, it's the strategy that is done by our office.

05:06 (AE): I think the next question, we [already] talked about it. You are pretty actively involved in the whole development process, right?

05:13 (JV): Yes. We're a group of people working with it, together.

05:19 (AE): It is a bit of a broad question: The overall objective is the implementation of the three phases? Is it something that is already fixed? Something that will certainly happen? Or, is it something that needs to be considered in an iterative process? In a way that the second phase might already safeguard the city to a sufficient extent?

06:02 (JV): That's the whole idea of having the three phases. That we're defining the solutions at the moment because we are not sure that this is enough or that this is needed. That's why we're doing it in phases. We take one phase at a time. Right now, we're taking care of the next five years, then the next ten years. We're constantly work [adjust] on it as we get more information: How much will the sea level rise? And, how many storm situations? Are they increasing so much as we predict? Because also all the climate models are uncertain. That's why we're doing it in phases. Let's build it in a way that we can make it higher along the way.

06:55 (AE): So, there is some flexibility inherent [focusing] at the moment, and looking how the [actual] situation is. There seem to be a focus on 'added value'. I think in Danish it is 'merværdi'. It seems to be a central theme, not only in the Storm Surge Strategy but also in the Resilience Strategy. How is this term to understood? What would be your [on behalf of the common understanding within the framework of the Storm Surge Strategy] definition of added value?

07:49 (JV): The main purpose might be to secure the city from rising sea level. But then the added value could be a better urban space, a space where you can hang out so that we improve the area for the citizens. It could be an area that actually increases the feeling of safety, a place where it is more nice to be, it could be an area that improves the biodiversity. Because if we don't build in concrete but build with natural materials we can actually also improve the biodiversity and maybe also the micro climate in the area. So, it's actually the things you put into your list [14 co-benefits on UAMC]. But, if we see it in terms of urban development then the added value is something that gives something back to the city. At the moment, we have this playground that's [been] converted from just being a football field to being able to store water. But then, we maybe remove the football field and bring a another football field and a basketball field and track. So, that we bring some added value. Now, we do a transformation of an area to bring in some new and better stuff for the area while we're doing the climate adaptation project.

09:37 (AE): But, it means also that, at least how I understood it, to adapt to the local context, because there's also this focus on [in the Storm Surge Strategy] trying to preserve the really particular identity of Vejle. Like, being located at the water, and water as a theme [of the city]. Do you think 'added value' is context-dependent? It seems that there are also cultural considerations included that are really particular for the city?

10:11 (JV): Yes, I think that added value is depending on where you are. At the harbour front the added value is maybe the possibility to touch the water, the possibility to go and fish, the possibility to sit and enjoy the area. In the Western part of the city the added value might just be a green area because it is built of concrete, now, but then if we have some more trees and grass and so on, then that could be the added value. So, it's different depending on in which area you are.

10:52 (AE): That is interesting that it actually [varies even] within a city. The next question fits really well, in this context: I read about a public meeting in 2019, [with the purpose of] asking the citizens what they understand about the term 'added value'. The focus there, was it on the whole cite of Vejle or only on the citizens of Fjordbyen?

11:34 (JV): I wasn't in that meeting. Actually, I'm not sure if it was only citizens of Fjordbyen or if the focus was on the whole of Vejle.

11:45 (AE): Like in general, the citizens what they expressed what they think 'added value' means to them, is it close to what we were talking about?

11:58 (JV): Yes, that's true. Having a place to hang out, public spaces, green spaces, all the things we need right now in this Corona situation.

12:17 (AE): I totally agree. There's some interesting things [about this whole situation around Corona]. It changed something. People are more outside, right now. They appreciate more to [be able to] take a walk, they see the city, they have more time to perceive the city, in a way. That is really interesting. Just a few questions about the connection between the Storm Surge Strategy and the Resilience Strategy. As we already talked about it, it's [the Storm Surge Strategy] is one of the lighthouse projects. How does the Resilience Strategy inform the Storm Surge Strategy? The 100 Resilient Cities Framework and I think it's seven indicators on what means to be resilient [as a city]. Is there a framework or concept that you try to pursue when you create the Storm Surge Strategy? [In other words,] Is there a kind of template you take from the Resilience Strategy and apply it to the Storm Surge Strategy? Or, how can I understand the connection?

13:40 (JV): I just try to find the Strategy.
(Brief interruption)
Of course we took notice of the themes from the Resilience Strategy. Because that's what we've been working on in the city for years. Then, we take these themes into considerations but it's not like we've defined a framework we work with. It's more that we need to bear all the things in mind when we work with the Storm Surge Strategy.

14:34 (AE): So, people that worked with the Resilience Strategy are there also involved in [the development of] the Storm Surge Strategy? Or, how's the communication between the two Strategies?

14:46 (JV): The people that were in charge of the climate area in the Resilience Strategy are also involved in the Storm Surge Strategy. We try to get around all the themes. We have these eight different from the Resilience Strategy *(JV points at page in Storm Surge Strategy)*. And, we're trying to describe how we interpret these themes in the Storm Surge Strategy.

15:28 (AE): So, that's where the connection is. There are a lot of approaches how co-benefit concept can facilitate collaborative planning. I guess, in the further development process [of the Storm Surge Strategy] you need to include more and more stakeholders from the private sector like business that are interested [in collaborating] or are also located in Fjordbyen. How do you approach these stakeholders? How do you include all the different things [interests]? You want to create a good environment of the citizens but you also need to please the needs of the private stakeholders. How to communicate it [these different interests] and how to find synergies that lead to the best solution?

16:54 (JV): It is a really interesting topic you're talking about, there. Because, there are of course, as you mentioned, different perspectives and different needs. But, we've been in contact with the owner, the director of the industrial harbour, for example, and they no as well that they have to raise their borders along the harbour area in order to not get flooded. And, they are willing to if we find some kind of agreement to make in public available [accessible]. So, that the people living around the harbour area are allowed to walk also in the industrial harbour area, and to make it pleasant to walk there. So, they want actually to build the resilience as well and add the value. If they have to raise their walls, they will make a pathway around, as well. So, that the citizens will benefit from it. We try always to take the 'added value' as an aspect into the discussion. So, that we can bring something back to the citizens, when we make improvements. But of course, it is also a question about money, so it is a balance.

18:22 (AE): So, it's a lot about negotiation. Where do you think lie this common interest? Why is the industrial harbour interested in opening up its area for the citizens?

19:08 (JV): It's a part of negotiation about how the port should be developed. Because in other cities they close down the industrial port. They need more money and people want to live in the harbour area. In order to keep the port alive and keep it still working as an industrial port, we need to combine both aspects: that people can live close to the harbour and that the industrial port can survive. It's a part of negotiation.

19:51 (AE): Just a few questions to the Urban Adaptation Measure Cards. Do you have the Cards in front of you?

20:07 (JV): Yes, I have.

20:09 (AE): A little a bit about if the provided information is comprehensive? The overall structure, for example, if there's something missing for certain stakeholders in case you might be able to incorporate it in [decision-making processes]? Maybe also [in workshops] with the citizens? I guess there are different focuses...

20:34 (JV): My first question is who is the target group? Who are the primary stakeholders? That is important to know?

20:45 (AE): My approach is not 'this is the [final] design' but more to figure out how to the design could look like. Let's assume now the [Urban Adaptation Measure] Cards would be used in a workshop with the citizens.

21:13 (JV): Yes, I think it's a level for citizens. Maybe also politicians that are not very much into the political part. There's a lot of information. So, that's good, the targets [addressed hazards] and where are we within the planning phase, the actions facts, and the description, and so on. So, that's good. (...) The second page with all the [co-]benefits and the SDGs. It's very good because you make it very concrete. You need to think of the project and then, what are the co-benefits. And then, I don't know what the purpose is? For me, this is relevant: we have improved the air quality, public spaces etc.. Is it for people to begin to think about it? Or, for the municipality to get some knowledge? Or, do see what the people actually think of the project?

22:38 (AE): This is what I assume: people often think of flood risk protection as something that needs to be 'hard' infrastructure, grey infrastructure that might not be able to add so much [added] value. My purpose was in seeing how they [the citizens] perceive the adaptation measure, how they think they could benefit from it. And, as a second point, and I can clearly see that this is the case, if you have thought about these aspects [co-benefits and SDGs] and how concretely they are connected to one action. But, also especially with the SDGs to find out more about the connection between local implementation and the broader context, the endeavours of addressing and implementing the SDGs at a national level. Is it something that is always present to think about the SDGs? Or, is it something that is taken for granted?

24:48 (JV): Neither one or the other. I think we know about it, and we would like to think about the SDGs but we don't do it in the same way all the time and in all projects, they are not always present. So, in a way of presenting a project with all the SDG's, so if I had to do it by myself or the people that did the project to mark the SDGs would make it more tangible, would bring it more to life. So, to have it present, to see that maybe five SDGs are touched upon in this action. Even if we didn't think about the SDGs when we formulated the project. Actually, I think it's a good idea. There's is a potential in bringing the project together with the SDGs and also the co-benefits to make both the developers but also the citizens, politicians aware of all the added value.

26:10 (AE): Do you think that the citizen are aware of and that they know about the SDGs? Everyone talks about SDGs, but sometimes I feel people still don't know what it really is? We're researching and working in the field, and SDGs are central to us. Do you've some experience on that?

26:30 (JV): That is only us who works with it. Cause I made quiz for Christmas for my family with all the SDGs in a kind of a [...] way where you have to recognise this and this with given titles. And, no one knew. They don't work in the environmental field. So, it's either for school children who have been taught about it in school or people working with it on a daily basis. Everybody else doesn't know. I'm quite sure about this. So, the normal citizens of Vejle wouldn't relate to it. They might have heard about it, they might have seen them somewhere in the city and so on. But, they can not tell what they [the SDGs] are about.

27:23 (AE): That's interesting. But, do you think that they at least know about the importance of implementing them [the SDGs]?

27:32 (JV): Maybe. But, it's depending on who you ask. Maybe, the higher you're educated, the more you know about their importance, you're more aware. But, the less you're educated, the less you think about them.

27:57 (AE): So, in a workshop with the citizens it might actually not be beneficial to talk about the SDGs? They might not have the same awareness as we have, right?

28:20 (JV): I think in a workshop the co-benefits might be more relevant to the daily life of the citizens. If you have improved air quality, or increased biodiversity, increased aesthetic value, you can relate to that in your daily life. But, to relate to poverty or hunger... The SDGs are very important. But for evaluating a concrete project in the city of Vejle, it's difficult to put in a workshop unless you want to make the focus of the workshop on how we use the SDGs in our city development. If we wanted to make the workshop about how we're using the SDGs, than it could be relevant. But, if it's about this specific project, I don't think that it's that relevant.

29:35 (AE): One last question: Is it ok, if I use your statements in my thesis report?

29:45 (JV): Yes.

29:50 (AE): Thanks a lot for your time. It was really interesting. Good luck for the further process of the project.

29:59 (JV): You're welcome. Good luck with your work as well.

Appendix E: Interview with Lotta Tiselius

Interview held on April, 28^{th} 2020 via online video conference.

Anna Eggert = (AE); Lotta Tiselius = (LT)

Information on the interviewee:
Lotts Tiselius is municipal architect and project developer in the department of Technical Affairs & Environment, Vejle Municipality. She was the representative of the project leader that was sick at the time of interview conduct.

00:00 (AE/LT): *(Greeting; Brief introduction/update on the project; Status of development process of Storm Surge Strategy.)*

04:46 (AE): In this context, I am interested in how you reached out the citizens to ask them about their understanding of co-benefits. I read about a consultation of citizens in 2019 that took place in advance to the strategy's formulation. It says in the report of the Storm Surge Strategy that the citizens of Vejle were invited tot take stand and to up with ideas for what they connect added value when talking about a future climate-resilient Vejle. Did you know something about this consultation and about the citizens' responses?

06:13 (LT): The thing was that we have. Each year in Vejle, there's this thing called the citizen meeting, Folkemødet. Last year, I wasn't actually working in Vejle. So, I wasn't there for the exact event. But I know that it was during the citizen meeting, Folkemødet, last year. They had this big poster up in the street, where people could come. And, I think it says. Maybe I should find it. I think it's easier if I find the pictures.
(Trying to find the pictures.)
Because I actually think, in fact, that was a really fast [undertaking]. 'OK, we need to go out in the city and ask some citizens what they think about this.' And then, it just happened, you know. I actually don't think that there was so much planning before. Ah, here we have it. OK. I'm just gonna share my screen with you. It's this picture down here that says 'Folkemødet dag 2019'. And, it's this 'byen ved vandet: what does co-benefit mean to you in the city of Vejle?', I think. And, then there was different categories. You want me to find a more precise picture of this?
(AE: That could be really interesting.)
Ah, I think, here we have it. Can you see the pictures? No, I think you're still in the PDF, right?
(AE: No. I can see the picture.)
They put this one up and then people put dots in to what they think 'added value' means to them. I could also send it to you if you wanted. Here, you can see people putting up the dots. There's especially a lot on this one. I don't know which category it is. I think it has something to do with green and the nature.

09:45 (LT): And, it's also because we had our PhD student. We had a PhD student, Andreas, here. He's an anthropologist student from Aarhus university. And, he did quite a lot of work especially on flood proofing around the sort of more... I think his field is techno anthropology which has to do with digital and like virtual technical aspects of how we assume and relate to the world we live in. *(Information on Andrea's work and exchange of contact details.)*
So, this was sort of a side-track. But, should we go into the questions?

11:31 (AE): All right. Actually, this was kind of one of the questions. I think you already mentioned it the two overall objectives of the Storm Surge Strategy. Or, not the objectives but rather the advantages of being adaptive and providing added value.
You said you're the representative of the project leader, at them moment.

12:11 (LT): Yes. Christina, our project leader, she's been sick and gone for a months, now. So, I've been taking over quite a lot of the leading of the project.

12:27 (AE): What is your profession?

12:33 (LT): I'm an architect.

12:36 (AE): The next few questions addresses a little bit more the relation between the Storm Surge Strategy and the Resilience Strategy. I was wondering, because it's [the Storm Surge Strategy] one of the lighthouse projects, if there's a kind of guideline that needs to be followed, a kind of framework. The Storm Surge Strategy probably needs to address objectives that are incorporated in the Resilience Strategy. How do you approach that? How free are you in your formulation [of the Storm Surge Strategy]? How does the Resilience Strategy informs the Storm Surge Strategy?

14:35 (LT): I think that the way that it's done... What I know is that the way that it's [the Resilience Strategy] used in the Storm Surge Strategy is that it's used as a sort of guideline on which themes we work within. If you see in the [Storm Surge] Strategy or in the proposal of the [Storm Surge] Strategy we have these seven or eight themes that we want to use like social, resilience and then co-creation and there are different things there we use. I don't think that's something we had to do. But, it's very, how do you say... Like, all the strategies that we do in Vejle connect to the Resilience Strategy. I think the Resilience Strategy was established in 2016 and we were chosen among these 100 cities worldwide. And, it's a really big organisation. So, it's been a very big part of Vejle, sort of a public identity for quite while, now. And, then it also has this... I mean, storm surge protection is all about being resilient. So, it's very well connected, either way.

15:16 (LT): It's just a part of how we work in Vejle to use this Resilience Strategy. Then, as you said, Fjordbyen is one of the lighthouse projects. It's also written into the identity of Fjordbyen that it's the city part that meets the water. All of comes sort of quite naturally. I don't think that there's been any particular sort of legal or decided connections between the Storm Surge Strategy and the Resilience Strategy. But, it's very clear to us that we connect them. Our municipality director he's very... The Resilience Strategy is very due to him. And, it's been always be a part of how he talks about Vejle. So, it's just a part of the identity here in Vejle.

16:18 (AE): So, it's really central, I see.
How do you think the co-benefits we talked about is not only something of value for the citizens. To please the needs and concerns seems to be central theme and core issue [in the context of Vejle] but you also work with a lot of other stakeholders. I got told that there's this idea of opening up the port area and make it accessible for the citizens. That requires a lot of negotiation with the business with the land owners. How do you see the co-benefit approach in there? How to you address also the economic issues?

17:31 (LT): You mean sort of how to promote the co-benefits?

17:37 (AE): Exactly. How to promote them and how to use them. How to negotiate. Regarding, what are the interests of businesses?

17:52 (LT): Well, I mean it's really interesting. It's a really interesting question. And, one of the really great things of working in Vejle as an architect but also working in Vejle, right now. Is that, we have some really good examples, already now, of how to use co-benefits and actually add value, like in money seriously. Look at the Bølgen, the wave building, down the harbor. It's so much tourism [there]. And, now Fjordenhus, the building by Olafur Eliasson, the budget is just like to big. It's just through the roof. The people that paid for the building. So, you could never say that "OK, we're gonna build a building. It's gonna cost 2 billion dollars and it's gonna add so much value to the city." No one will ever be able to explain that until the building is there. So, it's really great, right now, that we have some of these buildings. We have Fjordenhus and the area around and the accessible ground floor for the public. And, we have the floating kajak club where you can walk out on. We have quite a lot of these places down by the harbor where it's very very clear to see that it adds so much value. Because people are there, they hang out, they are in the sun, they came travelling from other parts of Denmark to see it. Especially, the connection between art and city spaces is very very strong in Vejle.

20:18 (LT): We have, for example, the Vejle Spildevand, the company that have all the sewages, the water treatment in Vejle. The whole water tank area of Vejle Spildevand has huge art installations by Ingvar Crohammer right on top of it. I'm gonna show you, here.
(Looking for pictures.)
This is my boss she's the city architect. And, this is a presentation that she made for the Art Foundation in Copenhagen, a while ago, where she talked about art in Vejle and Vejle Municipality's strategic work with art in city planning. Especially, this one what I just talked about is Ingvar Crohammer's installation on top of the sewage down in Vejle. He has also been part of this that is up in Jelling a smaller town in Vejle Municipality. This is the monument area in Jelling. I think it's parking side or something like that where they made this installation to sort of mark the landscape. You can see there are quite a lot of places in Vejle where we use the pictures of water or the images of nature as a part of how we draw the city. This is Henning Larsen's project who has designed this [art piece] for the sewage [covers]. It looks like the drops of water. It was an architectural competition. There's quite a lot of examples on stuff that you cannot really put an amount of money on it before it is there and can say that this is gonna add value to the city. But, when it's first there, it becomes a part of the city's identity. And, it's so valuable. And, it's what makes the citizens proud to be part of the city, and what makes them show when they have visitors coming. You probably now it from your hometown, as well. I mean what do you show your family when they come visiting. Especially, Fjordenhus is such a great example. I think it took 15 years from the first idea to the finished building that we have today. It doesn't matter how much it costs. It's just such a strong identity for the city. And, the ground floor is open for the public and it's flood proof. It's actually the most resilient building we have in Vejle.

24:10 (AE): So, what you say is that it's of value to have good examples?

24:18 (LT): Very much. If we only talk about added value or like co-benefits... You need to show, as you also said how do you talk with the citizens about it, how do you talk with the harbor industry about it, for example. You need to have these examples. And, I mean, I think most cities have some of them. Even if it's just something old [historic], something left from the second world war, sort of monument. Something, you know. It can be whatever. Like the bunkers down at the Danish West coast, it reminds us of a horrible history but it's also part of the identity, now. And, it adds value. So, it's very much about how you talk about it. And, that you sort of pinpoint the thinks that you already have.

25:25 (AE): And, it's probably also about [creating] multi-purposes. It's also about creating sides that fulfill different purposes. The Fjordenhus is not only super resilient but also, like you said, accessible for the citizens. There are probably businesses inside. What is there inside, again?

26:02 (LT): It's Kirk Kapital [A/S] as it says, here. It's the Kirk brothers. It's three brothers and they are related to the Lego family. So, a lot of money, there. I think they are working with investment, sort of. It's just called Kirk Kapital. And, I mean 'Kapital' means money. It's the office for the company. I think around 30, 40 employed people sitting in the building, here. And, then the three brothers have one huge office each on top of the building. I think going back to your question on how you communicate this to the citizens is having good examples, getting these pilot projects going. You can have really long projects where you talk a lot and it's very strategic... But, also sometimes have some sort of quick projects. Maybe where you get like a fund coming in and financing some of it. Because if we just talk people are gonna fall asleep, in the end.

27:40 (AE): How does it work? There was this public meeting planned for the 16^{th} of April. It was meant to be public to the citizens but was it also planned to be public to other stakeholders, businesses that are interested?

28:09 (LT): Yes. That was meant to be open for everyone. That was cancelled, as you know. Should I run through what our plan is from now on until the summer? Maybe that would be interesting for you.
(AE: Yes, please. I'm also interested in how you coordinate it, now.)
So, this is for Tuesday next week. We're gonna have... You know we have the Storm Surge Strategy that we work with, and parallel to that we're part of Realdania's project 'Byerne og det stigende havvand'. I think that's quite important to know. I'm just gonna show it to you, as well. Realdania has chosen to fund eight pilot projects during 2019, 2020 and 2021, I think it is. Funding for doing the processes with how the cities manage the rising sea level, storm surges and flooding. And, Vejle is one of the cities that were chosen. It's quite interesting to see. The presentation I was gonna show you, is that on Tuesday we have a status meeting with Realdania and the steering group of the Kommune [Municipality]. So, it's also with our head director [councilor?] of the Kommune [Municipality] and the art director of 'Teknik og Miljø' (Technical Affairs & Environment). And, they're gonna go through what the status of the project is.

30:44 (AE): The Realdania project is related to the Storm Surge Strategy, right? It's the same project?

30:52 (LT): Yes. So, our Storm Surge Strategy is called 'Stormflodsbeskyttelse der gror med byen' and the project that we've got money from Realdania is also called this. So, the strategy is called this and the process as well. The thing we've got money for is to make all these events: like the process with the citizens and the citizen involvement.

31:30 (LT): So, what's happened since corona: We had this original plan where we were going to have these four events during 2020. And, then this [COVID-19] happened. Then, we were like 'what are we doing now?' and we talked a lot about how to handle this. We decided to have... Instead of just cancelling all these events we would try to have a bigger digital focus. But, also being very clear on keeping the focus on the three themes. We have three themes in this project which is 'water'[vand], 'nature' [natur] and 'art' [kunst]. So, how it look now is that we're gonna have - during spring and summer - a more digital focus. We're gonna have some digital citizen involvement on Bylab Vejle [Citizen lab Vejle], the online platform. So, we're gonna try to have some more dialogue there. And, after the summer when the world is again a little bit more open we're gonna try to meet some more. So, we're gonna focus quite on the page and how to develop that and get people talking and communicating, here, on the website. One of the new things, that we decided, was that we're gonna make two films, two communication films during 2020 to get the story about storm surge and the adaptive strategy and the co-benefits out to the citizens and try to get that a larger understanding through moving pictures. So, that's a new thing. We didn't have that before but we did that because of the corona. And, then we have our idea competition. This was announced the 1^{st} of April and it's gotten quite a lot of focus. So, that's really interesting. And, the delivery of the proposals is gonna be the 15^{th} of July. And, we're gonna try to find the winner during fall. And, we were supposed to meet all the interested competitors in Vejle on the 16^{th} of April. What we did instead was that we made this communication videos that we sent out last week. And, they've got quite a lot of focus as well. So, that's really nice. So, it's one of the first projects where we're trying to be more digital. And, it's a very much explorative [exploratory] process as we learn as we go. And, the other two things that we're gonna do... We're gonna make a pop-up city lab on the harbour square down in Vejle. Where the citizens can come down and learn about sort of the flooding heights, the strategy and stuff like that. And, also where don't need to have these meetings with a lot of people. But, people can go down in their free time, open air, and see stuff. Even tough the world is not open to large meetings, again. And, the last thing that we're also gonna do from now on is that we've an artist, Regitze Engelsborg Karlsen, who is making a co-creative, explorative [exploratory] art project with the citizens. And, her dialogue is going over bylab.vejle.dk, the platform, as well. So, that's also one of our aims during this year. So, it's these three themes: the nature and nature-based solutions in the competition, the water as sort of the common understanding and art as how can we talk about these difficult themes by during it through art. That's sort of what we're doing, right now. So, it's these three projects. But this [the art project] is one of the 'most-out-in-the-city' projects that we're gonna do.

36:07 (AE): And, that will be established very soon already?

36:13 (LT): Yes. I mean we already have the platform, it's been open for quite a while. But we're gonna make some changes on it and then send out a sort of press release, next week and a Facebook post and stuff like this. So, that the people will go and start commenting.

36:59 (AE): It's really good to see that there's still so much going on [despite corona]. Especially, with the switch to the digital communication.

37:13 (LT): I think that can be quite fun to follow as well. Because if your project is about co-benefits, all of this stuff we actually do is about co-benefits. Like, all the things we're trying to do is to make it more fun to talk about it, make it more attractive. So, people also in the future will have a picture of... that we need to make it more attractive, then just building walls along the water.

37:43 (AE): Maybe it's actually a good point to switch [to the Urban Adaptation Measure Cards]. Because, I see you have a lot of communication tools going on, with the films also the 'new-old' platform. Just a quick look at the Urban Adaptation Measure Cards. Cause the focus doesn't lie that much on them anymore in a sense of an actual practical use. Because, I'll actually not be able to use them. They were meant to be integrated in a communication process as you're doing it with the films and the art project with the citizens. Trying to create a process, gathering [sharing] ideas, finding a consensus. The back page addresses 14 co-benefits.

(LT: Do you mind showing them to me?; AE shares the screen.)

It's one example of the actions in phase 2, action 7: the harbor square with the harbor tunnel [Havneplads med havnetunnel]. [On the front page] you're having the adaptation targets, planning phase with deadline, project time. Some actions already stated the [estimated] costs. These are the information put that could be valuable. Then, you have a short description [of the action], like what is it about. And then the climate benefits where I distinguish between climate benefits with regard to flood risk reduction, in this case up to 2.5 meters, but also increase of thermal comfort. What can be really interesting with nature-based solutions. And, on the back page, [you see a version] that is more created for the development process of the Cards. Because, I wanted to see or get feedback how I can actually interlink these addressed co-benefits with the SDGs. So, this page is not meant to be like that if you wanna use the Cards. If it's supposed to be an information tool, then, it would be probably more created in a way that you have the addressed co-benefits stated and maybe also the SDGs.

42:48 (AE): My aim was to use them with several stakeholders at the same time and to see like what kind of presence or what kind of understanding experience co-benefits. To me it seems to be something that is more easily to communicate [with the co-benefits in a sense] if something is attractive or if I see something green, it really has a value for myself. And, that's an immediate value. My understanding of the Cards needs to be clear especially with regard to the target group of the Cards and the use of the SDGs. And, it seems like that it's something I take for granted because we work and study in this field. It's really present for us. But, I shouldn't take it for granted that also all the citizens are aware of it or all the stakeholders.
(LT: No. Yes, exactly.)
How do you see the value of the SDGs? In general in urban planning processes in Vejle but also specifically regarding the Storm Surge Strategy? How do you see stakeholders involved? I saw more and more that businesses try to incorporate it [SDGs] in their philosophy and state how they address these co-benefits. So, what is the relevance of SDGs?

44:40 (LT): Well, I think that... The way I see it we've tried sometimes to sort of making it an active way of how that works in the departments. And, there are of course some of the goals that fit very well into work. I mean, especially, goal 11. And, in this project it's also about 13, 14 and 15. I think that - maybe that is on a personal level - the Sustainability Development Goals are... I mean we all wanna work with them. But, it's a bit difficult to work with them, sometimes. We all wanna make it a part of how we work. And, all of the goals make sense and we really wanna use them. But, I think sometimes it's hard to get from that you just put the symbol on, like you just plaster the symbol on your layout - that you work with these goals. I don't think that we have a clear strategy on how to work with them, right now. I think all of the goals should be integrated in all projects that we make. But, it's also. It feels like it's a bit easier to use them as a checklist. But, I don't think that we have incorporated that in our work, yet. It's more on like a virtual level that some of us a very interested in it, and then, in some projects we try to work with them. But, it's not we haven't had a clear strategy on it. I mean it should also be mentioned that Vejle, from this year on, will have a special group within the politicians in Vejle to work with sustainability and the development goals. At least, from the beginning it was the idea to work especially with the development goals. But, I think that moved more towards to work with sustainability and bringing down CO_2 emissions, in general. So, it's not like an every-day thing that we use all the time. I don't think it is, no.

43:25 (AE): That's quite interesting. Just one more question. There are approaches of trying to incorporate the SDGs more. What I understood is that it's really hard. They are quite intangible and it's hard to actually use them. Within [initial phase] of my project, I dug more into the sub-goals and indicators [of the SDGs]. And, it becomes way more clear when you look more in-depth into them.

48:25 (AE): *(LT: It think so, too. Yes.)*
But, it lacks of a clear framework or guideline of how to actually use them. And, also how do you actually link them to concrete part in your project?

48:45 (LT): Yes, I think so, too. For example goal 11, that's what we all want to do. But, how? I think it's been more interesting to read on the sub-categories, as well.

48:55 (LT): Yes, I think so, too. For example goal 11, that's what we all want to do. But, how? I think it's been more interesting to read on the sub-categories, as well.

49:18 (AE): The first brainstorming was actually how to incorporate them [the SDGs]. There's the SDG Capture Tool by Niras. And, it was the idea of how we can combine it [with the co-benefit approach]. I'm a bit uncertain. Also for your work or for planners in general, it seems difficult to see how to incorporate them [the SDGs]. But, also what kind of value they offer. There's the national and international objective of following [implementing] the SDGs but how to actually incorporate them locally. Are they maybe already incorporated in the Resilience Strategy? And, they must be.

50:24 (LT): Yes, very much. Without actually mentioning them. Not even right before the Strategy was out. I think so, too. That's the thing. When you're making these strategies, right now, today. It's really one of these themes. I think one of the hardest ones is... I think it depends on what project. When I think about how I would like to use them, like on a daily basis, I think I would like to use them more like a checklist. To make me think of 'Have I integrated this? Or, have I integrated that?'. I think that's because starting with all of these in a project. I'm not really sure that that's how you sort of get the creativity going. Maybe, it's easier to apply them a little bit later.

51:34 (AE): Yes, I see. It's quite hard to make them concrete.

51:44 (LT): But, I think that's also the purpose of the goals. Maybe, it's also though of as having a sort of checklist.

52:05 (AE): I think that's it. It was really really interesting.
(Managing exchange of information, material, contact details and further work.)

54:04 (LT): I'll send it to you. And, then just write me if you need anything else. We can also talk, later on, if you need that.

Appendix F: Interview with Helle Thorhauge

Interview held on May, 5^{th} 2020 via online video phone call.

Anna Eggert = (AE); Helle Thorhauge = (HT)

Information on the interviewee:
Helle Thorhauge is urban planner in the department of Technical Affairs & Environment, Vejle Municipality.

00:00 (AE/HT): *(Greeting; Brief introduction/update on the project; Status of development process of Storm Surge Strategy.)*

05:51 (HT): You asked me about my position in this project. I'm in Teknik og Miljø [like Lotta and Jette] and I'm in the planning department, [responsible for] local planning.

06:56 (AE): But it's in the same main department?

07:05 (HT): Yes. Teknik og Miljø are all together and under that you can find all the different [sub-departments]. Lotta and Jette work in environment and I work in planning.

07:23 (AE): Do you have assigned tasks within the whole planning process? What are your [specific] responsibilities?

07:42 (HT): It's not sort of very specific. If you're in the area of Vejle it's good to have different people when working in a group. Because I worked with things like building new houses, placing the roads, new factories. It's good to make sure that everyone updates. So, that not someone does something where I know that it's not possible. Sort of to make sure that the strategy with the rising sea level works with the development of the city.

08:51 (AE): The Storm Surge Strategy or the Stormflodsstrategi puts a strong focus on combining [incorporating] all objectives of the city since it's also based on the Resilience Strategy. But it also takes the Municipal Plan and other development plans into account. Is it also your responsibility to see that everything works together [gets aligned]?

09:23 (HT): It will be. But not yet. It's still in progress. If the Stormflodsstrategi is finished then the result will be some guidelines or regulations, sort of, and then... If someones wants to build a new house, then they would have to make sure that it fits into the strategy.

10:14 (AE): So, it's more like explicit [specific, individual] decisions when the action catalog is finished?

10:21 (HT): This is still in progress. When we finish the Strategy we will have some results that we can use in a solution catalog. And, this solution catalog will then be used by us. So, when someone wants to build I will need to look at the project and if it fits into the new solutions that were decided. So, it's sort of going from... Right now, it's a broad focus and then we try to bring all together, in some sort of, solution catalog.

11:13 (AE): Do you already have a date for the solutions? I might to remember that Jette said 2021, next year?
(HT: That might be, yes.) My initial focus was more related to the actual actions [measures]. And, now I had to shift and see it in a more broader context. The focus of the measures but also of the overall strategy is 'merværdi' [added value] as a central theme of the whole Stormflodsstrategi.
(HT: It is.)
My question is how is it [merværdi] understood in the Storm Surge Strategy? What is understood as 'added value'?

12:26 (HT): Well, it's sort of a... What might happen now is that we get someone who wants to build something, wants to change something. And, then we will not look as this as a part of the whole problem of the Stormflodsstrategi. It might just be this isolated building project. What we would like to do is look into this more as a whole: All the different things happening close to the water going into the same direction. So, together they will be... It's like a puzzle. And, every brick, [all] together they will show the good picture. But, at the same time they will bring some value to each little project. So, each little brick will be better together.

13:32 (AE): So, you say it's like a puzzle. What is the overall aim? It's not only about flood risk reduction, right?

13:42 (HT): Of course it is as well.
(AE: Yes, that is central, I guess.)
But at the same time it might be, be able to enjoy it, it might create a good meeting, you could create... That's what we're working on right now. Trying to find out 'what could that be?'. What could 'merværdi' be? That's what we're trying to find out. And, that's why we have called some architects that might give us some ideas. We're also working with an artist who should bring in, sort of, new ideas to the project. If we knew already we could just write it down. We're assistants in the process and, then, someone gets [brings] the ideas. I might not not this or this. We're trying to make people living in Vejle, architects, and artists to get the ideas, together. What might 'merværdi' be?

15:20 (AE): It's probably about putting a lot of different perspectives together and creating something that you have in common.

15:44 (HT): Yes. And also, the aim is of course that we keep the water out of the city, but also it is to make an awareness of the issue, and to discuss it. It's also about the politicians. In the end, they will be the ones to decide to put money aside for doing these things.

16:14 (AE): So, it's also about to sensitise for the topic. It's interesting. Also, that you mentioned the politicians. It's about various stakeholders that need to benefit from [and have in interest in] the whole strategy.

16:31 (HT): It's important to think about the politicians, but it's also important to include the people living in Vejle. Knowing the problem and talking about the problem. Because one day, we might need someone to make sure that it's safe and a good way how it is. They might have to pay as well. There are some places in Denmark where they have solved flooding problems like that. Let's say a group of summer houses. Each one of them needs to pay...all of them needs to pay together for something to be built to make sure that the summer houses don't get flooded. Like for example a dike that stops the water from coming to the summer houses. In Vejle we don't know, yet. But maybe it's not only politicians putting money aside, but maybe it's people as well putting money aside. So, making sure that Vejle is secured. It could come one day in the newspapers decided by the politicians: 'Now, everyone needs to pay!' Then, it's good to know, so it's sort of a good time in advance that this might be necessary.

18:14 (AE): So, it's also about who's actually responsible.

18:19 (HT): Who's responsible. Exactly! And, who must contribute to pay for that. Is it Vejle Kommune? And, are we the only ones that should pay for this. Or, is it also the people who own the whose, who have the factories, own the railways and the roads. Who must pay for this? In whatever we make for securing the Vejle By.

18:58 (AE): I see. It's about shifting the responsibilities. Concerning responsibilities, I read that there's cooperation with businesses but also with the [local] wastewater company [Vejle Spildevand]. What is there responsibility is the whole process?

19:32 (HT): Well, they also have problems with water and getting rid of the water, in a good way. Because Vejle has problems with water. Not only coming from the Fjord but also coming from the rain and also the groundwater is a problem. All these water issues together... Vejle Spildevand they also has a lot of working doing [managing] this.

20:16 (AE): I got told that it's also important to see the differences between the different water [flood] sources. Because, this strategy is explicitly meant to address storm surges.

20:36 (HT): And, that's because it's difficult to... If you want to talk about all these subjects together: rain coming from above and groundwater and the rising sea level and storm surges... Then, a huge book has to be written with all the problems and all the explanations and all the solutions and all the discussions with the people living and while and the workshops and that's not a... It's too complicated. So, we decided to just look at this problem.

21:26 (AE): And how do you bring everything together, in the end? Is it, if there's a problem that you look specifically at this? How do you communicate with all the other plans?

21:43 (HT): We don't know quite, yet. That's going to be, as I said, be sort of solution catalog. Of course, we cannot just solve one water problem on its own. But, first of all we need to look at each of them and, then, they can somehow be combined. One solution might be a problem for the others. We might make a solution for the rising level of the sea. That might create another problem with the groundwater. We have to think...
(AE:...about the trade-offs. Yes.
But first, we look at this and get a set of different ways that might be good for securing Vejle from flooding. But, then we have to make sure that it doesn't create other problems.
(AE: It's a lot of negotiation, in the end. Probably...)
Yes, negotiation. But also facts. Because we might come with a difficult solution for storm surges. But, then, our let's say, the people working with nature, they might say 'no, no, no that won't happen, because then you will kill all the fish in the fjord'.

23:37 (AE): So, maybe also more about knowledge [exchange]. That's interesting. Coming back to the Strategy itself. It's one of the lighthouse [priority] projects of the Resilience Strategy. So, it's integrated. So, you probably have... There are probably some core principles or core criteria you take out of the Resilience Strategy and apply it to the Storm Surge Strategy. Is it at this point of progress in the Storm Surge Strategy already relevant to see what the Resilience Strategy requires and what needs to be taken out of it. Or, is it also something that needs to be considered when you create the solution catalog?

23:46 (HT): I think while doing the solution catalog we will at the same time look at the Resilience Strategy. And, all the other things, as well. It makes not sense to create a catalog if half of the actions wouldn't be possible. As I said, you might kill all the fish or you might create another problem with something else.

25:20 (HT): If you just build a wall, six meters high around the water, that might be a solution but then again not. Because then you'll have visually a problem [an aesthetic problem]. So, before creating this solution catalog we have to look at all suggestions and discuss what is not relevant at all. And, there might be some solutions we cannot put into catalog because there are not OK with the Resilience Strategy.

26:20 (AE): So, also to see what works out together and what doesn't work out. And, maybe also, as you said, to find [gather] some new ideas, something that could fit without that you actually had known about. Just one or two questions to the Urban Adaptation Measure Cards. Cause I might not use them [in the way as intended], anymore.
(HT: Yes, you send them. I didn't read it.)
The Cards were meant to work as a kind of communication tool. It fits quite well about the topic we spoke of with regard to all the different stakeholders, and making the people aware of [the necessity of] climate change adaptation. And, what are each ones responsibilities? And, that it doesn't necessarily need to be something bad that we need to face climate change. Are there different ways of communicating with different stakeholders, like with the citizens, the politicians.

27:50 (AE): Yes, there are different ways. And, this has changed from the first step. Because of the corona virus. Our communication strategy has changed. In the beginning, we would have liked to meet people, talk to people four times over the summer period, before the summer holiday and after the summer holiday. And, we could not. Because we're not allowed to meet people. Instead, we have communication with some videos. I think Lotta showed you?
(AE: Yes, she did.)
And, also we have this competition with the architects [going on]. So, that's the way of communication. And, then we're thinking of meeting people, after the summer. We hope that might be possible to meet people and discuss with people. And, we still need to find out how we want to meet the politicians. They get information from the political meetings sometimes. We wanted to meet each party [individually] at a time for having a discussion. Or, if they have questions they want to discuss. But that has been cancelled. So, we have to see how to do it in another way, after the holiday. Also, we have this Bylab [Citizenlab Vejle], another way of communicating. Then, we have this project with [...]. We have contact with some creative architects. And, they make some sort of a sculpture, next to the harbour. We still haven't found out what they're going to make. It should be a place where also the children might wanna come. Maybe there could build their own sort of a dike. We don't know, yet.

30:44 (AE): So, you're trying to shift the workshops [to other ways of communicating] to make it as good as possible under these circumstances.

30:58 (HT): In need for a better solution, that's what we're trying to do. But, also we would like to have, every Monday at two o'clock, people can just come to the harbour and come for a discussion or a walk. To talk and at the same time to get information. Just to share general knowledge about the subject but also to try to get in contact with these people. Some of them have very negative or they're scared. Trying to get the topic early in the process. So, maybe that would be a [...], then.

31:49 (AE): And, it's interesting. To create such an open meeting, as you said, at the harbour front. Then, maybe also other people might coincidentally drop by or walk along, not only the ones that go consciously to a workshop because [for that] you need some initiative.
(HT: Actually, most people don't go to [a workshop].)
Because it takes some time away from the free time, probably.

32:16 (HT): But, also they might be scared, like 'maybe, I won't fit in' or maybe, they won't know what to say. Or, there will be awkward questions... But, we also talked about getting some gymnasium [highschool] students into the process. That has been cancelled. We couldn't do it, because of corona. There have been a lot of ideas, there have been a lot of changes several times.

33:12 (AE): But, it's really interesting to see how fast you actually adapt to the circumstances. Everything was really quick. And, there are a lot of options do in a different way. Even if not optimal, for right now, it seems to be really promising. I've one last question that might be a little bit out of context: The first idea of my project was to include the Sustainable Development Goals and to combine them... also, bridging the gap between local planning and national planning, and what role they actually play. I've kind of figured out that it's a bit hard to work with them. And, I just wanted to know your opinion about the SDGs.

34:21 (HT): I think that might be, you said 'what is "merværdi"'. That might be it. There might be many ideas. We don't know, yet. So, 'merværdi' might be building in a way that it's better or nature. It also might be to bring in more plants to cleaning the air. There might be different things.

35:16 (AE): And, it's also super individual, right? It's a matter of perspective, as well. And, it's important to hear everyone what they understand... I think that's it. Thank you so much for your time. Enjoy the day!

35:46 (HT): Thank you. You're welcome. And, good luck with your project.

35:47 (AE): Thank you very much.

Appendix G: Interview with Christina Olsen

Interview held on May, 18^{th} 2020 via online video phone call.

Anna Eggert = (AE); Christina Olsen = (CO)

Information on the interviewee:
Christina Olsen is municipal architect and project developer in the department of Technical Affairs & Environment, Vejle Municipality. She is the project leader of Vejle's Storm Surge Strategy.

00:00 (AE/OC): *(Greeting; Brief introduction/update on the project; Status of development process of Storm Surge Strategy.)*

10:11 (CO): I was thinking that I know when we created the Strategy [Storm Surge Strategy] that something I spoke a lot to our director about is the fact that... 'What is added value?' 'How do you measure that?' That is something that a lot of people are working on but nobody has found the golden nugget, yet. But also that the 'added value' you create is more than just for the riches who buy these penthouse apartments in the harbour residence area. And, I know that is something that we in Vejle want to achieve that it's added value for all the citizens and that we also would like - and I am afraid that is something that has been handicapped by the COVID-19 situation - is that we are very much into that people living in the social housing, people living in the penthouses, that people working in the industry, in the harbour area... that they create some kind of bond or co-creational room where they can participate and see each other and be part of this added value creation. We don't know, yet, because we are in the middle of it. And, as you know, it didn't exactly go as we have planned. But, I think that is something very interesting to look at. What you do to make that happen. How do you ensure that - because this is something we're gonna be facing the next phases. Because when you're, then, starting to do stuff and investors knocking at the door, and the politicians that were promising money and gold and all kind of things to have the opportunity to build stuff. And, then, we all know how it ends up looking: Just look at the Cobe Nordhavn project. I mean I'm really not impressed. It's good damn high. It's hard surfaces, it's very expensive, very expensive apartment, the life is only in the collage. If this it what happens, I can fear the same for Randers, I can fear the same for many of these project where the work with the social resilience is not taken serious enough. And, it's not taken serious enough how much work it takes - and it takes also money - and effort and time to make that happen. And, that's why I'm personally was extremely happy when we succeeded in telling the politicians we don't wanna a dam. We don't wanna dam that cost a billion that we have to finance, then, by letting everybody build what ever to just finance that.

13:48 (CO): We want to go with nature-based solutions that grow with the city, with the people. I don't know. It might become a complete failure. There are some brave people who put their ass on the light [?]. But, I believe in my heart, in my belly it's right. Because then we got together with the people who also are working and fighting to have the fjord become clean for the life to reappear in the Fjord. And you see, by making this choice, politicians making this very brave choice, it has started things. But it's a lot of wheels. I know that's something we're gonna go looking at. What are all these wheels we need to turn. Who do we need to put together in the same room. This is gonna be a true challenge for us in the next years.

14:57 (AE): You've touched upon three really interesting things. The first thing was, you mean the fear of 'gentrification'? [*Questions gets misunderstood by CO.*]

15:16 (CO): Yes. To get life back. Because of pollution from the farming and the streams which have been carrying pesticides and all kinds of stuff from the farming, both fish farming and agricultural farming. And, this has killed the life in the inner fjord. Cause Vejle Fjord is very deep. And, in this we have engaged also the people from [...] by the politicians choosing to say 'we want nature-based solution's'. Not just working on the city but also on the landscape in the Fjord, in the water.

16:03 (AE): So, you think the focus on nature-based solutions also brings in [new] possibilities, in a way, right? To integrate multiple objectives... As you said, bringing something back to nature and to the citizens.

30:30 (CO): Yes, exactly. How exactly it's gonna be... Maybe next year we're having a catalog that maybe shows some of the options. We are far from sure what we're gonna get. And, how we're gonna do it. But, we know - and Jette is also important part of it with her whole digital work - to get people involved. So, I'm very excited and nervous how we're gonna tackle it when money has come to the table. And, how the whole financing is. At the moment, I have no clue.

17:12 (AE): That's also what I'm not afraid of... But, if you pursue you a co-benefits approach, consideration of multiple co-benefits [objectives]. How do you measure it, how do you even see the impact, in the end? And, that's what also Jette said that it's so hard to evaluate [assess] the economic costs but also the savings in the end. I don't know how you're doing it. But, do you have experiences with other projects with nature-based solutions?

17:52 (CO): We're trying to. We have both, I mean me and Dana. We're quite a lot in a our team that have some practice in working with it. But I was also part of a big Scandinavian nature-based project. And, nobody knows. They were all their. Nobody has the answers. It's trial and error, at the moment. We're working with Rambøll. Cause they have a very nice lady who's working very much with this 'how to calculate added value'. And, she's working on trying to figure out ways so that you can communicate it with politicians and say 'ah, you invest this but you actually get that'. But, yes. We don't know exactly, yet.

18:56 (AE): It's still uncertain. Also, because there's not such of a long history, right? In these approaches [nature-based solutions], yet?
(*OC: Yes.*)
There are some projects in Copenhagen but not exactly with regard to storm surge protection, I think.

19:15 (CO): Yes. Exactly. And, I don't know if they actually calculate. I mean, they're doing things. And, some people are saying 'yes, you can see the prices of housing went up'. But, yeah. Is that a good thing? Maybe it is. I don't know. It very fast becomes political. Also, in a sense that 'how do you evaluate life'. How do you do that? Is it people that get less sick. Stuff like that which is.

19:56 (AE): It comes along with - if you break it down - even ethical considerations. You talked about 'social resilience'. How do you understand social resilience?

20:18 (CO): That's a good question. I mean, I didn't write the Resilience Strategy. That was before my time. I just made the Storm Surge Strategy. But at the basis, I found it quite hard to understand what exactly they wanted by that. But, as I translated it into the Storm Surge Strategy it was about this kind of richness in different people, from different social layers. So, that you have this kind of complete city where you have... You don't just make something for the rich. You create something or you create a framework that allows the possibility for people to meet in different ways. And, then, that you back that up with the whole growing of the city, the development. You evolve people at different levels and in many ways. So, to create this kind of co-creation and a dialogue. Now, we're also working with art. Because art can talk to you in other ways than technical ways. And, storm surge and these things become very technical and an engineer-driven thing. And, I think what was my goal with the [Storm Surge] Strategy - and my boss of cause - was to move. I don't know if you read our strategy.
(AE: Yes, [I did].)
But have of it kind of technical. And, that are my engineer colleagues who provide a lot of stuff with that. And, then the second part is more human, more architectural. To bring that into it was very important. Because in the end, we firmly believe that just the technical solution on its own is not... There's no added value other than keeping out the water. But, as the Dutch, they said - we spoke to [...] which is the Dutch maintenance group, if you want to call it like that, about all the storm surge project - and they said 'yes, then, it keeps the water out until it's high enough, until you have to pour more concrete into your fjord, until you cannot get the technical part that operates the [...]'. But, it's very much an experiment. And, it that sense we need very brave people. And, I'm myself, I'm surprised that we managed to get that approved. It's very experimental.

23:40 (AE): Yes, it is. Also because... I also talked to Lotta. She said that it's really difficult to convince politicians, people if you don't have best practices. To dare something new where it's so uncertain also financial-wise. It's really impressive that this came through. Especially, bringing so many different aspects to the Strategy, also as you said the more 'arty' approach makes it really interesting and kind of unique.

24:42 (CO): We didn't come across anything exactly similar. I would say. But what made it possible, I would say, is the fact that there is a lot of technical base work done. And, we had a lot of communication with other people, what did they do, what worked, what didn't work. That combined with the fact that there was a Resilience Strategy, that politicians and the top-level decision makers, that there was [already] a common vocabulary which was very much created by the Resilience Strategy. And, that has worked already a couple of years. So, there was kind of a common understanding. So, to say that you use that kind of words, and that this was important. In that sense it's been a long process that made it possible, you know. You couldn't just start with this. They would never agree. Because there would be too many uncertainties. And, there would be too many cases where they could blame for not doing enough or doing stuff that doesn't work.

26:13 (AE): That is a quite interesting aspect. Because I came also across the question 'how actually the Resilience Strategy informed or has informed the planning process of the Storm Surge Strategy'. But also the planning, in general, in Vejle. So, it seems like that it's quite present its vision [the Resilience Strategy]?

26:36 (CO): It is, it is. It becomes reused, this vocabulary created by the [Resilience] Strategy. Because it's... I think we're the only department doing that, in Project & Development. Actually like that. Because we see in it the possibility to search for new things and for more sustainable solutions. It gives us kind of a jumping board for a lot of sustainable work. And, that's why we were of course very scared. I don't know if you spoke to Gitte? She is not there anymore, in Vejle. She lives in Germany. Gitte Grove. Try to look her up on LinkedIn. I'm sure she would like to talk to you. She was our Resilience Officer and in charge of - and I spoke a lot to her myself - she was the one maintain the network and the connection to this whole Resilience Network [100RC]. And, that's why we were very scared. Cause Rockefeller [The Rockefeller Foundation] wanted to change the whole structure... We were very scared that the politicians would abandon our strategy. But they didn't.

27:57 (AE): So, it seems to be quite manifested, already, this vocabulary, this resilience thinking.

28:04 (CO): Yes, it is. So they were so happy with it. 'No, no we're gonna be on board of the European Resilience Network, instead. We're gonna keep focusing on it and trying to make... So, the park that is part of the Fjordbyen, the green line where we have this kind of rain water park. I think it's gonna open soon. Which was the first kind of step. But there was also a lot of co-creation with the inhabitants. Where we now also do a lot about co-creation with art and the water and... So, this is like the first kind of reals built little park, a little piece of the puzzle.

28:55 (AE): Is it like a kind of exhibition?

28:57 (CO): No, it's a park. It's a water park that collects rainwater from the hills and leads it into the fjord.

29:11 (AE): So, it's also a lot about - what I also read in the Storm Surge Strategy - to not even avoid water but to make it visible. And, to create this identity.

29:27 (CO): Yes. Because we know that we cannot experience... and with this we used to speak a lot to the Dutch. I myself worked it Holland for ten years. You will have water on the streets, you will have these events that surpasses the level you kind of protected yourself from. So, if you need to make people resilient and not scared in a way... but that you can embrace this water, or control and make the water run where you like the water to run. Because it's gonna come. Thinking that it won't come is foolishness. So, we try to take that in. It's also the - again that's the social resilience in my mind - that you kind of educate the citizens in Vejle to embrace. They are all like 'Oh year, it rains a lot. We have noticed that.' The streets would flood cause they lead all the water there so the rest of us don't have water in the basement. So, these are kind of projects we're working on, at the same time as the Storm Surge Strategy, is the whole rain water problem. And, that makes it a little bit complex that we have several issues, at the same time.

30:57 (AE): I was also wondering... That might not be the case, right now. But at some point, you also need to negotiate [align] with other strategies or other plans. Because as you said, there's many water issues in Vejle. It's not only about storm surges.

31:16 (CO): No, and we do that in the work with the same people that got infiltrated. It's very... Like the park that is in the area leas to the bay is part of the Rainwater Plan. But, this one they're working on, the strategy, they didn't manage to make a strategy, yet. Maybe, I have to. But some of us, at some point. I know they're working on it. But it's much more complicated because, the level now where they need to do things, you have areas which a preserved nature and all the farmers who own a lot of land. So, there are all these negotiations going on to kind of understand 'what can you do and who is willing to help?'. Because we need help. So, there are many things that play... Because the issues are so big. It's a little bit of a difficult topic you chose for your...Very interesting, but... That's why I was asking you what are you focusing on. Because I know that it complexifies in two seconds.

32:50 (AE): I know. My focus was on collaborative planning, in the first instance. But, I see the point that I cannot fulfill this only in a theoretical way. So, I really need to see how people interacts. I also need a broader insight to what stakeholders are involved. I think, there is a lot of work with Vejle's waste water company, the Spildevand.
(CO: Yes, yes.)

33:23 (AE): It's too big the topic for a thesis of four months. I totally see the point. It's super interesting. As talked a lot about the Netherlands, there are a lot of really interesting approaches and also platforms. I worked a lot with - how is it called, again - I think something with green-blue network [Urban Green-blue Grids].
(CO: Ah, the Green-blue Network. Yes.)
Where they started to collect all these measures and evaluate the different social, environmental and economic co-benefits. These are projects of years. It's quite difficult. It's just like super interesting.

34:27 (CO): And, it's like a glimpse in time, your thesis.
(AE: Exactly.)
And, you're touching in in a topic that is... We often describe this in the team. We often have the feeling that we're building the air plane and we're flying, at the same time. This is how we feel. I met a really interesting woman. You maybe know her, [...] from Oslo. She was part of the Oslo Harbour Strategy. And, what she said - I spoke to her when we were designing the process - and, she said - we couldn't come up with a name in the team, it just felt right to do it like this - and, she was like 'oh my god, you're doing an explorative process, this is really cool'. And, we were like 'that's what we're doing, that one'. We really had this feeling we were building and flying, at the same time. It's very much like that.

35:36 (AE): What I feel, especially, those processes that are little bit more explorative and unknown, there's lack of time for some reflection. There's no time to look back to see 'what is it what we're doing here?'. Have you been involved in the work with Andreas Brandt?
(CO: Yes.)
I also talked to him but more to get an idea what his research was about. Because he involved the citizens [in that], I think. About added value. It was really interesting to talk to him because he had this research perspective. And, I feel like it's not totally different approaches but I think there could be a lot of like collaboration going on. But, it's just like the time is too little.

36:48 (CO): And, he even realised that. And, he was with us for what six months. And, he just left when all the fun started. Because even he had to give up and focus on different things. Because he realised how complex it is.

37:11 (AE): Yes. He talked a little bit about the app they developed 'IReact'.

37:19 (CO): Which is like a little.. Which is one of the things that Jette - that's why we are a whole team of people, nobody can keep this all in their head... This is one little thing going on in one corner. Then, you're having that going on in another corner. Then, you have an event somewhere going on. Then, you have the politicians. Just to get a clue of these layers and who is involved, when and what impacts. It's completely... You need a big breath.

37:56 (AE): I guess that's a lot, yes. That's actually an interesting thing: How do you allocate responsibilities? Or, are you sitting all in the same boat? Are there some people responsible more for the citizen involvement part and some are more [responsible] for the technical part?

38:20 (CO): We have different hats. I am the PL [project leader]. I'm trying to keep the overview. But, then we have some who are, like Jette who is digital layer and also of the whole resilience, she's very much into that. Dana is very much co-creation lady, who works with this volunteer forum, green forum. There's a lot of nature-based things and citizen-driven projects, co-creation. She's very much into that. Then, we've Ulla Pia who is the engineer and who worked a lot with the Coastal Secretary Ministry [Danish Coastal Authority?], and all these kind of heavy, complex things. She works with that. Then, we have Lotta and I who are architects who work very much with 'how do you, then, create things?'. The creative process. 'How do you create a city?'. So, like that... And, then we have other colleagues who are other departments, the guys who know the biology [?] and who know everything about the fjord. And, the planning: Helle who knows all about these planning laws, the local planning, and all this kind of heavy paper work. So, the more legal aspects. So, like that... You need to be a big team of people to drive a project like that.

40:14 (AE): Do you think this project involves more complex decision-making processes? It seems to be like much more aspects to [consider]. I don't know in what kind of other project you've been leader of.

40:44 (CO): This is my first Kommune project. So... But, of course I worked a lot together with Kommune projects, as an adviser, a private adviser. I have the feeling a lot of things are like this. They are also learning inside the Kommune. This kind of change from very much 'one person had an assignment, someone made report, someone put the stamp, go'... I think Andreas was tapping into that, too. It's also inside the Kommune people have to learn, to build bridges between the silos, the silos they lived. The fences are high, very high. And, you have to sometimes bring forward the slash hammer to make a hole. But, you need that to create projects at a resilience level. I think we simply need that. I think somehow, it's a culture that is growing, it's starting growing. In this project - I know for sure - many people... I had people coming to me and they were like 'Nobody ever asked me for my opinion, before. Nobody ever asked me for advise, before'. And, I was like 'What?! You don't do that all the time?'. And, they were like 'No...'. And, I was like 'OK. That's how I used to work.' I always worked like that. That's why I did it like that. So, I think... Like that it's also kind of a project that pushes the boundaries a little bit for 'how do we co-creation internally in the Kommune?'. Because there are so many people who know so many things. You know, it's like this kind of cartoon image where all the people are in their grey cardigans in their own little cubicle trying not to be visible, making their own little things. This is very much true. Still...

43:07 (AE): It's also a matter of habit, right? It's hard to break habits.

43:14 (CO): Yes, it is. Especially with people that worked, there, for many years.

43:26 (AE): One last question: You talked about Gitte Grove.
(CO: She was out Resilience Officer.)
I read two other names... Is it the officer that is in charge of the Resilience Strategy [communication with the 100RC network]?

43:53 (OC): Yes, she was the one going to the meetings. She was the one who was making sure that the [resilience] idea was kind of put into practice. She was part of the team of the Kommunaldirektør, the director of the Kommune, who is like the right hand of the mayor, I guess. She was also providing them with materials for the politicians. So, part of creating this language.

44:28 (AE): But didn't get this position replaced by someone else?

44:34 (CO): Yes. I don't know who took it. If it's temporary. I don't know. I didn't see it replaced, yet.

44:53 (CO): Yes, I hope that they will. But, I actually don't know what they will do about it.
(AE: OK. Perfect.)
I hope I haven't only made things more complicated.

45:09 (AE): No. No worries. It was super interesting! Thank you very much for your time. All the best.

46:21 (CO): You're welcome, Anna. Have a nice day. Bye.

Appendix H: Interview with Ole Fryd

Conversation conducted on May, 20^{th} 2020 via online video conference.

Anna Eggert = (AE); Ole Fryd = (OF)

Information on the interviewee:
Ole Fryd is Associate Professor for landscape architecture and planning at the department of Geosciences and Natural Resource Management at University of Copenhagen. He is the editor of the status report 2019 of the project 'Cities and the rising seawater' (Byerne og det stigende havvand) initiated by Realdania [Fryd and Jørgensen, 2020] (- a selection of eight pilot projects in coastal cities among which Vejle and its Storm Surge Strategy is one of them).

00:00 (AE): *Greeting; Brief introduction into the study project; Current status and focus.*

04:15 (AE): First of all, I'd like to know a little bit more about the status report. Just like maybe a brief outline: What is the report about, what is this objective and how is it actually related to the Realdania project?

04:43 (OF): Starting with the last question, Realdania they've got this initiative on storm surges or cities and the rising sea level. And, within that initiative there are four different focuses: One is knowledge creation, one is case study, one is community engagement, and the last one is something else, I can't remember really. But I think it's something about the pilot projects and so on. So, they've got four different - you will see them on the website. And, within that framework there is a knowledge component. And, that's about mostly research institutions contributing with some knowledge in this field. So, initially, in the first year, it's been a review of the state of the art with international best knowledge, available knowledge on urban adaptation to sea level rise. And, there's been seven different disciplinary reports developed.
(AE: Sorry to interrupt, but within the framework?)
Yes, within that knowledge framework. There's urban planning, landscape architecture and architecture. So, the planning is about the planning mechanisms and processes. Architecture is about the built environment, the co-design, the [...] aspects. Then, there's the economy, the economical aspects, basically at the societal level. So, cost and benefits of different options. Then, it's about the legal framework. What is made from a law perspective: legislation, regulating, development and also the division of responsibilities among stakeholders. So, the [...] aspects. Then, it's about the anthropological side of things. What is the social resilience side of things? How to build resilience into communities? And, what are the impacts of disasters on human mental health and physical health and so on? And, then, there is an engineering component about risk assessment, risk management, all this kind of disaster risk reduction theory.

07:51 (OF): And, then, the final is an interview among six different municipalities in Denmark about this status in the municipalities: What is the practices on coastal planning and coastal protection?; Who is responsible?; Which sections or divisions in the municipality are responsible?; Do they have a lot of experience in this field or is it an emerging issue?; Do they have... this king of the policy, the financing, the collaboration with all these landowners, in particular, so what is the way that's been done?. And, that's based on interview with the different municipalities in Denmark. So, we have seven reports in total. And, out of these seven reports... All these reports have been developed by academics in the different fields, like Professor [...], Professor [...] and so on. And, based on that there's is the status report which is a kind of a synthesis report that compounds the key messages, key points from the seven reports. So, in a [...] manner it tries in 20 pages to summarise what it's about.

09:16 (AE): Do you remember which these seven or six municipalities were? [*Questions gets misunderstood by OF.*]

09:30 (OF): I can't remember if it's six or seven. There's engineering, planning, architecture, economy, anthropology, and law. I think six disciplinary pools and, then, and a seventh which is a backup [?], the status in the municipalities in Denmark. And, then there's this synthesis report, status report which is number eight, which is kind of a synthesis report with the key arguments from the other studies. And, what is it about, the report, the status report? It's basically first, it's about kind of what are the [...] scenarios, what are the expected levels of sea level rise. And, also how does that impacts the storm surge risks. So, that's kind of the science behind it. In particular, it should... There are three different regions in Denmark: the Northern Sea region, the [...] region or what is it called, the sea between Sweden and Denmark and then, the lower Baltic Sea region. And, the data shows, in particular, the Baltic Sea region is particularly subjected to sever storm surges. So, that's kind of the first chapter, it's mapping that. The second chapter is on...
(AE: Definitions?)
Oh, yes, some definitions: introducing resilience, the IPCC approaches about protection, accommodation, plant retreat and so on. And, also the [...] strategy which is essentially not building in flood [...] areas. And, then there's also this resilience approach. We make the division between engineering resilience, ecological resilience, and evolutionary resilience also socio-ecological resilience. That is introduced in the second chapter. It's kind of a theory, definitions and concepts. What are the kind of key concepts in this field. And, then we go on to particular focuses, I think. It's on... the architects have developed a framework where they division between static and dynamic processes. Static elements, it's kind of an [...] how to secure the city. Or, where it is more dynamic, and they have kind of a division between built infrastructure in traditional civil engineering works and more nature-based solutions. So, that's resending [?]. And, then a couple of case studies that are being presented from the urban North America, in particular.

13:11 (AE): Yes, these are the international examples, right.
(OF: Yes, right.)
And, I also saw that you contributed, together with Gertrude, to the summary of the professional notes. How did this look like? What was your part? You're in urban planning, right?

13:38 (OF): So, Gertrude and I we also wrote this urban planning disciplinary report. So, out of the six different disciplinary reports that's where we wrote the one on urban planning. What was this about... I mean, we also introduced the concepts on resilience and also, there's something about adaptive pathway planning or adaptive planning pathways. So, some of the literature working on long-term planning. So, how to make long-term strategies and also make sure that short-term decisions do not impede long-term sustainability. And, we also had a couple of case studies. In particular, the North American 'resilience by design' ideas. So, that's from Arthur [...] in New York. There's been some reconstruction that are building on resilience thinking. And, that's reported. So, initially founded in New York but has also been implemented in Boston, in Houston, in San Francisco Bay. So, there's some kind of approach that has continued which is also, actually, part of the American International Development Assistant Program [?] that has this resilience backside approach to build resilient communities across the world. So, we use that approach and we refer to that.

15:23 (AE): I just read that conclusion upon it - probably among other conclusions - was that one problem was how concrete projects actually relate to this resilience approach. What was the overall recommendation or the conclusion?

15:56 (OF): I better open the file because it's a bit out of memory. Just hang on a moment.
(OF is looking for the file.)
(AE: It's also just translated from... It's maybe a bit difficult to generalise. And, it's on page 9 what I was referring to.)
Yes, I've got in here. I just need to open it. So, this is the planning report, right?
(AE: Exactly. Right. It's basically your contribution to the professional notes.
By the way, are you in an Environmental Planning program?

16:58 (AE): Urban planning. My background is in engineering, Environmental Engineering. But my current Master's is Urban, Energy & Environmental Planning and the specialisation is called 'Cities & Sustainability'.

17:22 (OF): And, is it at the Copenhagen campus or in Aalborg?

17:24 (AE): In Aalborg.

17:32 (OF): So, this is a report on urban planning as part of the synthesis. We highlight three things: The first thing is about resilience thinking and also about evolutionary thinking. So, it's more about... it's related to the thinking of sustainability transition. So, it's more systematic or systemic changes of society, fundamental changes in society. And, coastal development is also related to that.

(AE: But it's all in the framework of coastal protection or rather of adaptive planning of coastal regions?)

Yes. Because one of the distinction is when it comes to coastal protection it's a lot about technologies, and it's a lot about protection. But, accommodation is only partly part of the argument but plant retreat or avoid strategy or plant retreat, in particular, is completely omitted from the discussion. And, it's not on the agenda at all. If it's at least one of three to four different key approaches by the IPCC. How come that's not at all part of the scope in discussion options and solutions? So, that's kind of one of the things that we're highlighting. Plant retreat, phases to phase out... Housing estates or summer cottages that are particularly vulnerable. So, we always continue to protect human built environment by all means even though might be economically not feasible, so and not sustainable. But, it's not on the agenda at all. It's not politically feasible or anything. So, this is part of the thing we highlight. It's a particular [?] issue that's not on the agenda at all, not even discussed. We suggest why not at least start a discussion about it as an option, not immediately leading to action but it's about discussing the pros and cons of these approaches in an even play field. So, this was part of it. And, then, it's about adaptation pathways. So, it's about dynamic adaptation over time and that's also related to much what the IPCC reports are about: transitions and transition pathways and so on. But, how does that translate into planning practice? And, sub-component of that is this thing called the levee effect [?] or the levee paradox. And, that means ones you've put in a levee or dyke, then, you have to [...] allowed urban development on the [...] for ever. Obviously, you need to maintain that dyke and you need to protect and that reinforces that for ever. I mean, put it down again once you've built it. And, that exposes a large proportion of the people into the future to a higher risk because you still build in the [...].

21:49 (AE): You touched upon the differentiation between coastal protection and climate adaptation. Because there was also one chapter about the status of the practices in Denmark. And, that there's actually little experience in such approaches like in nature-based solutions or in more adaptive solutions. And, one thing was pointed out - I don't know if the translation was properly made - but that the employees actually need to shift their position from a 'coastal protection position' to a 'climate adaptation position'. That comes along with some problems because of lack in experiences in such approaches. And, that is actually also what Vejle Municipality said: The Storm Surge Strategy is something new, something experimental as well.

22:49 (OF): Yes, I mean that goes well along with what the study indicated. There used to be usually just one stuff, [...] stuff who had a part-time position on coastal protection. And, coastal protection is about building dykes. But now it's a growing field and they have more GIS experts involved on board, they have more kind of the emergency response division and also more, now, the social science experts that's about community resilience and collaborating with authorities. So, that's kind of a growing issue. But they're starting on this, only. They're starting to have new stuff members.

23:49 (AE): And, back to this systematic transition. Because that's part of my theoretical framework to see institutional barriers. Or, what kind of institutional changes it requires. You said that there's [only] a slow transition going on. But, what are the challenges? In the interview with one of Vejle Municipality, she said that it's super difficult to break these habits and also to create some awareness of multi-disciplinary approaches. She said she's always worked like that and that there were some colleagues that were astonished about collaborating in such a way, now. Where do you see the problems? Because, as you said, these approaches need to be put into practice, somehow.

25:03 (OF): Yes. From the six different municipalities that we interviewed it's also clear that they have six very different approaches. It's very context-dependent: the size of the municipality, the wealth of the municipality, a how vocal the residence are - I mean there are some places where they are very clear about their rights and demands and other places where they might be more passive. So, their messages and responses seem to be very context-specific. And, we also experienced that there are some municipalities where there's a lot of investment in built urban development, new constructions and so on, economical investments. [...] on that process to install kind of climate adaptation measures in that process. So, when they say we make a new road or... They see that. Some would say it's infrastructure with climate adaptation on it. So, the climate adaptation is the added value. And, in other times it's often climate adaptation with added value. But, they say it's the other way around in particular places. They say we've got of infrastructure, a lot of construction going on and we have to implement that. But okay, we can then add on and think [...] about how does that lead to all the thoughts of added value, how can that be an added value for them. But, in other municipalities it was the other way around. In brief, is some places they want to build their way out of problems and in other places it's about negotiating and talking and finding... it's more of a diplomatic process of negotiating, responsibilities, cost distribution and so on. So, it varies with the local context.

27:21 (AE): Yes, it's interesting that, even in Denmark which you might think is quite a small country and that still differs in such a great way between the different municipalities.

27:37 (OF): Yes, right. It was [...] how the processes were. And, we could also see different levels. In some places, it would be climate adaptation or coastal protection as strategic, as at the top level and, the leading civil servant in the environmental department. And, in other municipalities we met people on the floor, it was more of a day-to-day practice. So, it's also kind of how much is it seen as a kind of strategic planning discussion and how much it's kind of more a day-to-day maintenance what is similar to whatever handing out [...] permissions or collecting garbage or whatever.

28:35 (AE): That's what I've also figured out that... Vejle is benefiting so much from this Resilience Strategy because it comes along with kind of common understanding or common vocabulary. And, it's not necessarily something you can take for granted that's going on like that. That there's such a clear line of what they actually understand under resilience to them.

29:12 (OF): One of the other things that we also identified that there's... It's such a small country but there are 98 different municipalities and there's all... And, at the moment there's also some [...] legislation that the municipalities increase, so increasing responsibilities of the municipalities to do and to approve coastal protection measures. And, that means that it's now from being an issue government of the state is now governed by local governments, municipalities. And, that has create an impediment for collaboration across coastal lines, beyond the boundary of the municipality. [...] for more reasonable collaboration but it's not being easy to implement that, to coordinate it. And, coast lines are dynamic and they don't know the administrative borders. So, it's a challenge. And, it's also about climate adaptation where it's about a certain level of sea level rise or a certain leveling regarding the storm surge leveling. And, that kind of easily gets from a technical discussion to a political discussion when it's in a local municipality, and people or the mayor or whatever. It's not really typical. Anyways, the municipalities, in general, they call for some kind of framework or some clear mandate from state level. So, that the state or the UN or whoever, a comprehensive body, gives some clear guidelines on the level of or the height of the levee or whatever. Because otherwise it easily gets a political discussion rather than a technical discussion about risk and... And, they found it challenging in the municipality, they had kind of some organisational issues that making the scale is too close to the stakeholders and the ones that impacting by making investment. And, they would get further into the discussion if that was more top-down like there's a sea level rise and there's a consequence. And, now the state has actually started to provide that. The Danish Meteorological Organisation [?] they developed some code and they call it 'Climate Atlas' where they provide data publicly available. And, it's about the fine scale. I mean it starts to be something that could be used as an authoritarian [...] for which level to secure for. And, then getting beyond the local political discussion.

32:43 (AE): I guess it's quite difficult to create a framework [in a sense of] how narrow to you do you design such a framework or such a guideline. Because as you said the local context is so diverse. I see the point. It needs something that keeps away the interference of local interest and local power structures. That actually leads... There's one chapter, chapter 5 that provides a proposal for a framework of the analysis and development of coastal projects. What is it about?

33:39 (OF): Yes. I mean... It's kind of a framework trying to map out measures and somehow providing typologies of solutions. It's based on IPCC approaches on protection, accommodation or adaptation and, then, plant retreat. It's based on sea level rise and storm surges. The division between sea level rise and storm surges is also a temporal issue: Sea level rise is this gradual slow burning issue and will take several centuries to affect. The storm surges are present and at risk at every time. But the time perspective is shorter. It might be a day or two before the storm hits and then it retreats in another two or three days. So, it's something about the time perspective, here, and the temporal scale that is added. So, that's what they suggest to have some kind of framework that is more certain about the time perspective. What are we actually adapting to? I mean, ideally, it should be both. But we do not meet two. We only... I don't know. I mean this is a kind of two-sided issue. I mean what are the time perspectives that we look for. We can do initiatives, now, that can be adaptive over time. Or, we could also have stupid solutions, now, where we built the Atlantis of the future. And, in two hundred years they will look back and say 'how stupid was that'.

35:50 (AE): It needs a certain degree of flexibility, right?

35:58 (OF): And, that what leads back to this adaptive pathway planning.

36:07 (AE): Just briefly to the international examples. What were they about?

36:18 (OF): We had one from the Netherlands which is implemented and two which are just concepts and drawings but it's not yet... one from Boston and one from Long Island. The reason why those were chosen was to see what can we learn from them. And, what are the kind of cutting edge, the most innovative or integrated approach. And, what seems to be the newest trend in coastal development. There's a tendency towards more hybrid solutions to conventional protection and landscapes. And, there is a high emphasis on re-establishing [...] or re-establishing wet-lands or kind of dynamic coastal areas. So, that the coastal zone is a transition zone rather than a line. I mean this idea of a coast line, a static line on the map... There's a transition away from the coast line to a coastal zone where it's about gradients of different levels of humidity, different levels of sea levels, different levels of salinity and so fourth. And, this gradient is something that, now, the landscape architects but also the planners, the politics want to take on as an emerging task for developing better solutions.

38:19 (AE): All these examples where more focused on concrete projects or more the cities themselves, how they manage?

38:31 (OF): I mean the Realdania initiative focuses entirely on cities or built environment. So, that excludes rural areas or scarcely populated areas. Also, it's not so much coastal regions it's more cities.

39:02 (AE): How would you point out the overall objective, is it like knowledge creation, learning from each other, best practices?

39:27 (OF): I mean this report goes into one of four components and that was knowledge creation, sharing the state of the art. And, the next step would probably be to have field trips and to do site visits to have member of the Municipality of Vejle and other places to go to see and visit the projects in New York and so on and to talk with the planners there and so on. And also professionals in consultancies and so on. To gain more knowledge and insights of what has been done elsewhere. And, how that potentially could feed into local practice or at least broaden the field. In the end of the day, it's Denmark, and in the end of the day, it's a discussion about the height of the dyke. It's not really about if there should be a dyke and it's not really about how the dyke should be designed. It's only about... And, that's a very narrow discussion they lead.

40:38 (AE): It was really astonishing for me that it [these discussions] is still such an issue. I think I was lost in this conviction that nature-based solutions is thing that is pursued but it's not something that's been really experienced or implemented, yet. I think it's also related to seeing the coast as a concrete line as something that cannot move and has some flexibility inherent. But, yes. I'm quite biased I see.

41:21 (OF): I was part of the team that did the review of about 50 something projects in Denmark and the conclusion was that 80% of all coastal initiatives were coastal protection and usually hard infrastructure.

41:55 (AE): Very interesting. That was quite enlightening. Very interesting topics and a lot of aspects that the status report touches upon. And, it's probably just a glimpse of...

42:24 (OF): My recommendation would be to focus on page 15 to 17. There are ten kind of bullet points that are highlighted and you can see if it makes somehow sense. And, then we try to say... Based on the different disciplinary reports, the interview that the municipalities had and other the discussions that we've had across disciplines and with professionals. There are some of the key issues that are relevant to keep in mind into the future. Is it about the time perspective, is it about perceptions of risk and the scale issue, what is small and large or local, regional and national level? What is actually the issue about resilience and nature-base solutions? And, all that is highlighted in these bullet points.

43:27 (AE): Perfect. I'll have a look there. I think that's it. Thank you so much for your time. Have a good time.

43:38 (OF): My pleasure. Thank you. Good luck with the completion of your thesis. And, if you have any clarifying questions don't hesitate to contact me again.

43:53 (AE): Thank you very much. Bye.

43:57 (OF): Bye, bye.