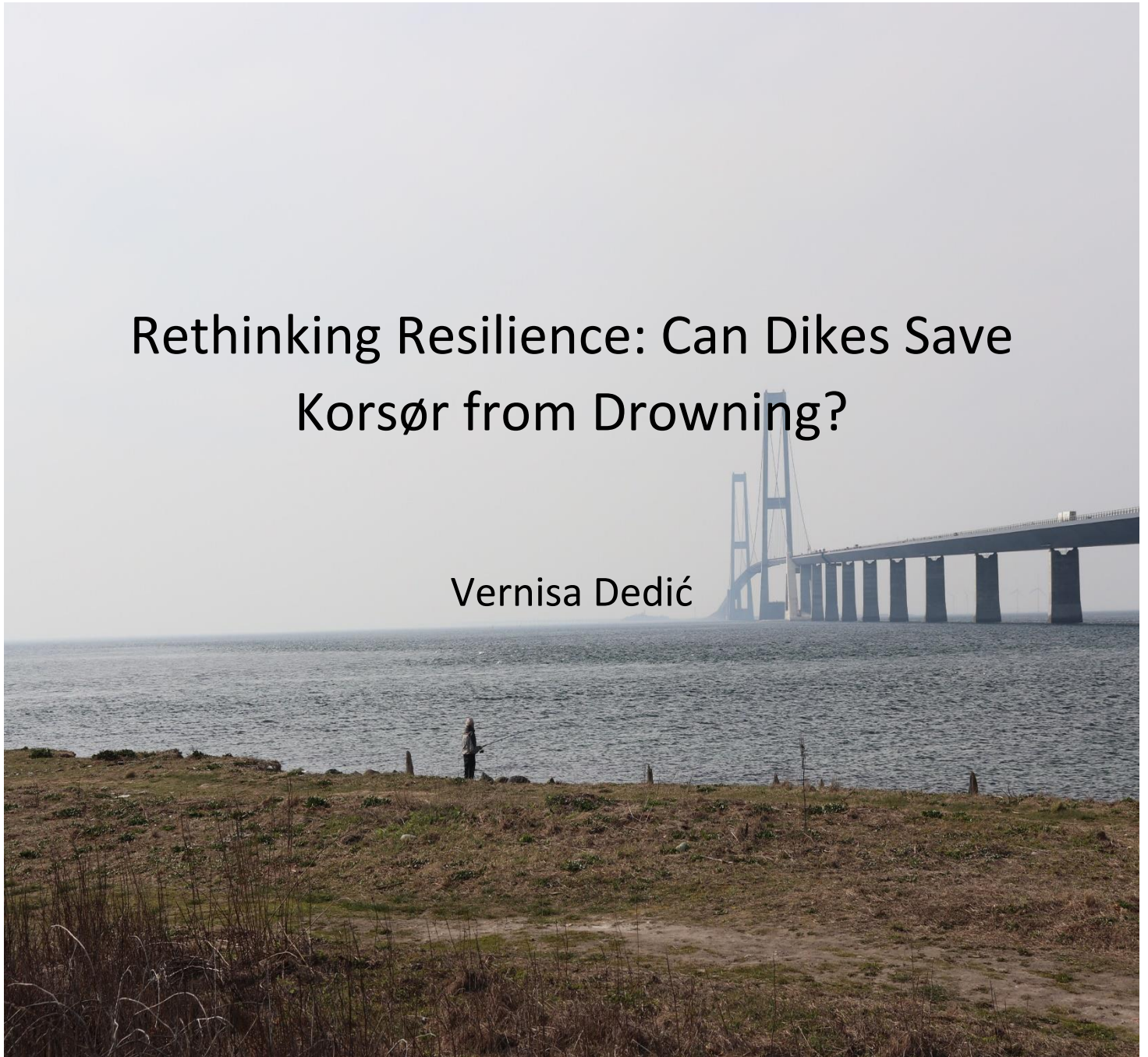




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Rethinking Resilience: Can Dikes Save Korsør from Drowning?

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Abstract

In 2006, the city of Korsør in Slagelse Municipality in Denmark experienced the worst storm surge recorded in history. In order to prevent greater damage of buildings and sensitive infrastructures in the future, dikes and evacuation procedures have been brought up for discussion. This thesis examines resilience to flooding in Korsør by conducting in-depth qualitative interviews with a resident from one of the dike groups representing citizens in the Halsskov area, and two project leaders from the municipality to talk about the rationale of official strategies. The framework developed by Restemeyer et al. (2015) has been applied to assess the flood resilience strategies in respect to ‘robustness’, ‘adaptability’ and ‘transformability’. Through the findings and analysis, four major attributes are uncovered to explain why technical measures are favoured above others, but also why building dikes are being prevented to become a reality: lack of finance and resources, clash of motivation between the residents, rigid bureaucracy and differentiation between practicality and creativity. Nevertheless, technical measures are not contradictory to a resilience strategy as robustness is part of resilience. In the case of Korsør, there is thus great evidence to explain how the municipality and the residents in Halsskov are well on the way to adopting resilience-based strategies, though still has a few obstacles to deal with.

Key words: *Korsør, Halsskov, Slagelse Kommune, Denmark, resilience, strategy, flood resilience robustness, adaptability, transformability, flood-risk management, flooding*

Table of Contents

Abstract	3
Introduction: Korsør's Consequences of Floods	7
Context and Problem Definition	7
Research Purpose and Question.....	10
Content and Outline of the Thesis	10
Delineation of Geographical Field - The Case of Korsør.....	11
Previous Research.....	12
Theory: A Strategy-Based Framework for Examining Resilience	17
Resilience Characterised by Robustness, Adaptability and Transformability	17
Ramifications of a Resilience Approach to Strategy-Planning	19
A Strategy-Framework for Evaluating the Flood Resilience in Korsør.....	19
Content - Measures and Policy Instruments	20
Context - Strategic Issues, Institutional Structure and Legislation	21
Process - Intellectual, Social and Political Capital	22
Intellectual Capital.....	22
Social Capital.....	23
Political Capital.....	23
Methodology and Methods.....	25
Research Design	25
Semi-structured Interviews (Municipality vs. Citizen)	26
Research Method and Post-interview Considerations.....	27
Method of Data Analysis and Nvivo	29
Findings: The Outcome of My Research.....	31
Finance and Resources - Municipality and Residents Suffering Serious Financial Burden	31
Interview Informant 1 - The Resident.....	31
Interview Informants 2 and 3 - The Municipality	33
Sub-Conclusion	35
Clash of Motivations - Disagreement between Dike Group and Landowners	36
Interview Informants 1,2 and 3 - The Resident and Municipality.....	36
Sub-Conclusion	38
Rigid Bureaucracy - Preventing Development of Dikes	39
Interview Informants 1, 2 and 3 - The Resident and Municipality	39
Sub-Conclusion	40
Practicality Versus Creativity - Dikes Merely Seen as Defenders and Non-integrative.....	41
Interview Informant 1 - The Resident.....	41
Interview Informants 2 and 3 - The Municipality	42

Sub-Conclusion	44
Discussion: Assessment of Flood Resilience in Korsør	46
Content – Measures Applied to Minimise Flood Probability.....	46
Dike Problematisation.....	47
Types of Infrastructure in Korsør	48
Lack of New Solutions.....	49
Context – Institutional Structure and Legislation	50
Assessing the Effectiveness of Flood Prevention Measures.....	50
Redistribution of Responsibilities	51
Innovative Solutions Seem Too Risky	52
Process – Intellectual, Social and Political Capital.....	52
Robustness.....	53
Adaptability	53
Transformability	54
Conclusion: Can Dikes save Korsør from Drowning? – Yes, but Not Permanently.....	56
Bibliography	58
Appendices.....	61
Appendix I: The transcript of interview with Interview Informant 1 April 6 th , 2019.....	61
Appendix II: The transcript of the project leaders Interview informants 2 and 3 April 2 nd 2019	70

List of Figures

Figure 1: Houses alongside the coastline in Halsskov (Vernisa Dedic, 2019)	7
Figure 2: Floodable areas with multifunctional use by Sørensen et al. (2016, p. 7)	15
Figure 3: Korsør City Centre (Vernisa Dedic, 2019)	17
Figure 4: Visual representation of the strategy-based framework	24
Figure 5: Halsskov near Storebæltsbroen (Vernisa Dedic, 2019)	25
Figure 6: Korsør City Centre (Vernisa Dedic, 2019)	31
Figure 7: Halsskov beach (Vernisa Dedic, 2019)	46
Figure 8: Halsskov area with summer houses (Vernisa Dedic, 2019)	56

List of Tables

Table 1: 'Effect matrix with scores on criteria for the various strategies' by Vis et al. (2003, p. 38).....	14
Table 2: Overview of the strategy-based framework by Restemeyer et al. (2015, p. 49)	20
Table 3: Overview of interviewees.....	27

List of Maps

Map 1: Risk areas (“Risikobilledet,” n.d.) identified since 2011 in Korsør which are at risk of increased sea level rise and storm surge	9
Map 2: These affected areas are divided into five sub-areas in order to tackle the risk individually. However, area number 5 has been discarded (Teknik og Miljø, 2015).....	12

Introduction: Korsør's Consequences of Floods



Figure 1: Houses alongside the coastline in Halskov (Vernisa Dedic, 2019)

This chapter will present the problem area for this thesis in Korsør, Denmark, followed by the research question, and lastly what has previously been written about resilience-strategies to floods.

Context and Problem Definition

In Global Risks Report from World Economic Forum (WEF, 2018, p. 11), some of the urgent environmental issues that people are facing nowadays are extreme weather incidents and temperatures, increasing rate of biodiversity loss, air, soil and water pollution. It is patent to see that there is a correlation between human-made emission of greenhouse gases and global warming (Krausing, Jarl, Madsen, Simone and Jørgensen, 2017).

According to the UN IPCC report, with very high confidence, it is predicted that the sea level will rise throughout the 21st century and beyond and will affect the coastal systems and low-lying areas in the form of submergence, flooding and erosion (IPCC, 2014, p. 68). This is also evident in Denmark. The country will become warmer, experience more rain, and a higher sea level rise, which has already been the case. In the last 100-150 years the average precipitation in Denmark has increased by 100 mm, the sea level rise has risen by 2 mm a year, and the yearly average temperature has increased in total by 1,5 °C (DMI, 2014 cited in Krausing, Jarl, Madsen, Simone

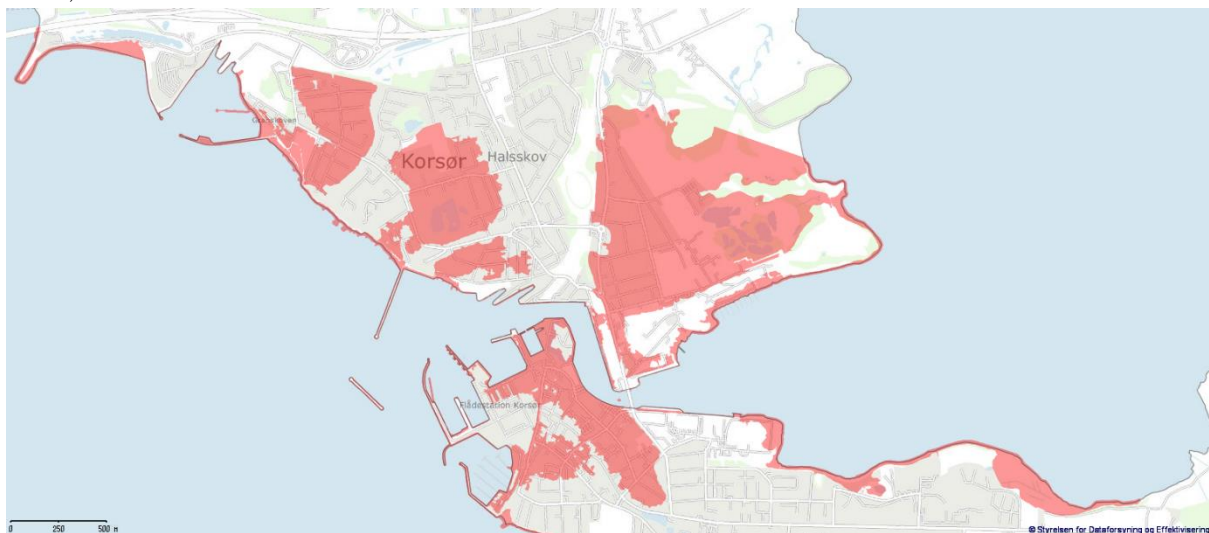
and Jørgensen, 2017). The Danish Coastal Authority (Kystdirektoratet) published the latest coastal report that suggests a 38% higher possibility of flooding in Denmark towards the year 2115, compared to today, and with recoil-scenarios affecting the Western coasts of up to 64 meters on average, and the inner coasts up to 35 meters on average, as a result of sea water increase and stronger winds (Kystdirektoratet, 2016 cited in Krausing, Jarl, Madsen, Simone, Jørgensen, 2017). What was previously defined as a relatively rare 100-year occurrence, now happens more often; oceanic-related flooding is now categorised as an every 20 year occurrence (DMI, 2014 cited in Krausing, Jarl, Madsen, Simone and Jørgensen, 2017).

The IPCC SREX report's definition of floods is "*the overflowing of the normal confines of a stream or other body of water or the accumulation of water over areas that are not normally submerged. Floods include river (fluvial) floods, flash floods, urban floods, pluvial floods, sewer floods, coastal floods, and glacial lake outburst floods*". The different kinds of floods are created by different mechanisms (Kundzewicz et al., 2014, p. 2). This thesis will specifically deal with coastal floods caused by storm surges.

The prospects of higher water levels and more frequent floods, due to climate changes, currently threaten 10 Danish cities, including Korsør. Locks, concrete walls and houses with built-in plates that keep water at bay are some of the investments that will be necessary for these cities, which have been appointed as being under significant threat of flooding, according to the Danish Coastal Authority and the Danish Nature Agency (Dansk Naturstyrelsen) (Jyllandsposten, 2012). In late 2018, the Danish Coastal Authority published a report showing a new national overview of areas where the risk of extreme flooding is highest in the future, which means that it has since increased to 14 areas on the list, instead of 10 (Kystdirektoratet, 2019). This is an indication that climate change is affecting more and more regions in Denmark, and some areas are more vulnerable than others; for this reason, municipalities must have a particular focus on how to prepare for more extreme weather and flooding in the future. Part of the planning process involves creating a risk-management plan for prevention, protection and preparedness. With no action, 23,000 properties summing a total property value of 84 billion DKK, are otherwise at danger. So, there is a lot at stake. According to Per Sørensen, coastal technical manager at the Danish Coastal Authority, Korsør constitutes a particularly difficult task, since the city faces towards the water and has a long waterfront. He suggested that one solution could be installing sluice gates that channel the water out, but that would be too expensive to build it (ibid).

The worst flooding Denmark has ever witnessed occurred on 1st and 2nd of November 2006, where the storm from the north caused the sea level to rise at the inner coasts from normal to

record-high in just 12 hours. In many places in Denmark, the situation became life-threatening, dikes being destroyed, and mass evacuations being implemented (DMI, 2008). In Korsør, the water was 1,77 meter above the normal water level, seeing as building dikes had not been considered as part of previous national emergency management (sn.dk, 2019). As a result, there were huge amounts of water storming at the harbour, the southern city district was completely flooded and many areas in the northern district experienced, sea water filling the streets and pavements (“Højvandsikring Halsskov,” n.d.). It may not be until year 2022 that the citizens can expect permanent flood protection, which means it would have taken 16 years to safeguard the city, despite their having experienced several floods since the most extreme incident in 2006: the latest being on 2nd January 2019, where the water rose above 1,17 meters on average (sn.dk, 2019).



Map 1: Risk areas (“Risikobilledet,” n.d.) identified since 2011 in Korsør which are at risk of increased sea level rise and storm surge

Slagelse Municipality has a long coastline and the land is so low that it relatively often experiences flooding. Given the climate change prospects such as flooding is expected to occur more often. To counter this, authorities have mapped out areas in their ‘climate plan’ which are above ‘kote 3m’, meaning up to 3 meters above daily water (see map 1 above). The problem is greatest in and around Korsør and therefore, they have had to design a strategy of protection, with the purpose of uncovering and remedying the problems with flooding (Slagelse Kommune, n.d.).

Despite the importance of addressing the issue of flooding, solely relying on traditional flood control measures is considered inefficient, because the damage can still be severe if the flood control cannot be upheld. Taming nature is admittedly a difficult task (Restemeyer et al., 2015). This concept of resilience to floods can be viewed as an alternative approach to planning. Resilience is used to describe: 1) the capability of a system to “bounce back” to a single

equilibrium (Pimm, 1984; Cohen et al, 2011 cited in Sørensen et al., 2016); 2) a measure of robustness or buffering capability prior to a disruption, which forces a system to move from one steady equilibrium to another (Holling, 1973; Berkes et al., 1998 cited in Sørensen et al., 2016); or 3) a system's capability to adapt following a disruption (Pendall et al., 2010 cited in Sørensen et al., 2016).

It is said that people have the capacity not only to react to disruptions, but also to prepare for and learn from them (Becker, 2014 cited in Sørensen et al., 2016). Korsør presents an interesting case to examine the degree to which resilience has played a role in terms of flood-risk management. Resilience and resistance strategies have often been differentiated since they sound contradictory. Scholars (Godschalk, 2003; Davoudi et al., 2012 cited in Restemeyer et al., 2015) indicate that resistance and resilience are not completely opposites. Certainly, one attribute of resilience is 'persistence' (Holling, 1973 cited in Restemeyer et al., 2015, p. 46), "the power to resist attack or other outside force" (Godschalk, 2003, p. 139), and 'robustness' (Davoudi et al., 2012 cited Restemeyer et al., 2015). These terms illustrate that resilience can be synonymous with resistance and can be regarded as one essential component of resilience.

Research Purpose and Question

In the light of the above section, the purpose of this thesis is to therefore apply the concept of resilience into an operational framework that can be employed to evaluate the flood resilience in Korsør. Resilience is conceptualised as *robustness*, *adaptability* and *transformability* within the context of city and flooding, though this will be explained in depth further on in this chapter. With the help of a strategy-based framework, it can be possible to assess flood resilience strategies and patterns in Korsør. By concentrating on strategies, my objective is to transform the way we think about resilience as a concept to an actual action; from 'defining' resilience to 'doing' resilience. Therefore, the main research question is:

How is the notion of resilience understood and to what extent is it applied as part of flood risk management in Korsør in Slagelse Municipality?

Content and Outline of the Thesis

The thesis is composed of:

Introduction: Korsør's Consequences of Floods; Introduces the field problem, purpose and aim, the geographical area and previous research.

Theory: A Strategy-Based Framework for Examining Resilience; Outlines the framework for the analysis.

Methodology and Methods; Describes methodology and methods applied in collecting the data.

Findings: The Outcome of My Research; Presents the results from interviews without interpretation.

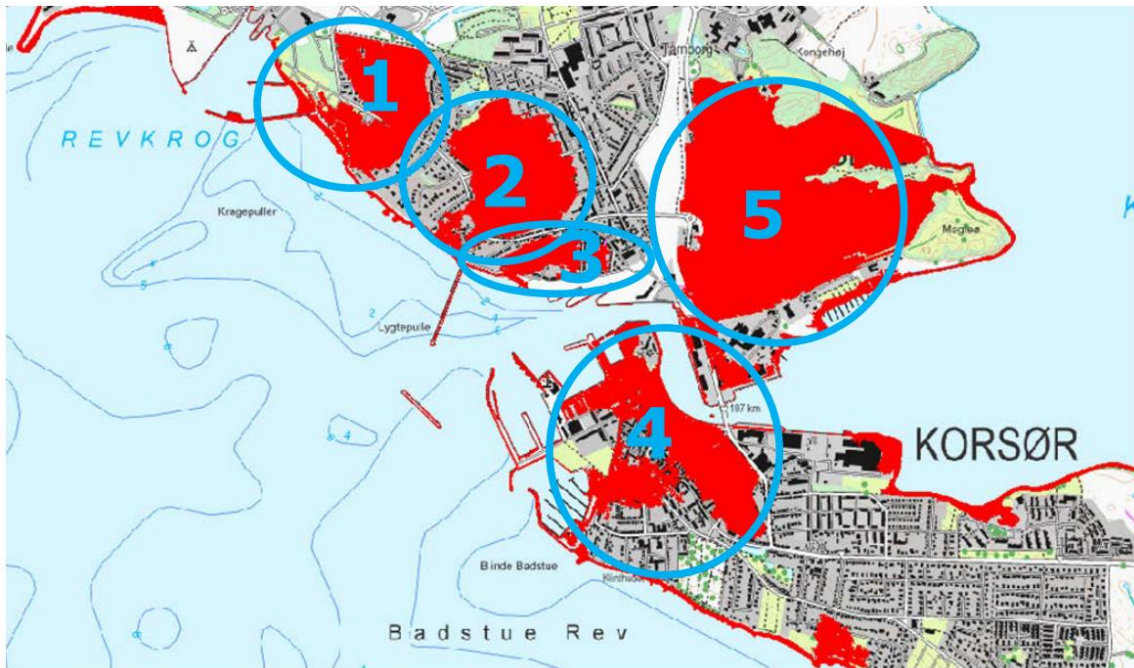
Discussion: Assessment of Flood Resilience in Korsør; Presents a discussion of the analysis.

Conclusion: Can Dikes Save Korsør from Drowning? Yes, but Not Permanently; Concludes the findings and suggestion of ideas for future research.

Delineation of Geographical Field – The Case of Korsør

Korsør, with its population of 14.603, in Slagelse Municipality, Denmark, comprises the main case study of this thesis. Although the whole of Korsør is generally subject to flooding, the municipality has two appointed areas, where there are ongoing projects for coastal protection. The focus areas are Korsør city centre and Halsskov. Each area has its own separate page on the municipality's website where they usually inform about flood protection and latest updates. The latest updates on Korsør city centre were released on 8th October 2018 ("Højvandssikring af Korsør bymidte," n.d.), though have been running since the end of October 2017. In regard to Halsskov, the latest updates were released on 12th March 2018 ("Højvandssikring Halsskov," n.d.), though the regular updates in plenum for all sub-areas in Halsskov had begun from as early as the beginning of January 2015.

As can be gleaned from this, Korsør city centre is quite a recent particular focus area, likely due to the storm flood of 2017. Regarding Halsskov, it was chosen to be a particular risk area in regard to flooding from the sea. The location and arrangement makes it vulnerable to higher sea levels and stronger storms, resultant of climate change ("Højvandssikring Halsskov," n.d.). Initially, 'dike groups' were created by Slagelse Municipality in Halsskov, so the municipality, together with the landowners, could find the best methods for protecting citizens' local area against flooding from the sea. The consensus was that the municipality and residents must develop different solutions to preventing the homes of 800 landowners in Halsskov from being flooded. The vulnerable coast at Halsskov is divided into three sub-areas with each dike group (Teknik og Miljø, 2015). Below, there is a map of the sub-area (map 2), where dike group 1 is responsible for the first area, dike group 2 is in charge for the second area and so on. Area 4 is marked as Korsør city centre.



Map 2: These affected areas are divided into five sub-areas in order to tackle the risk individually. However, area number 5 has been discarded (Teknik og Miljø, 2015).

The rationale is that each dike group is formed exactly by the needs and wishes which the landowners have. Every sub-area is encouraged to create a ‘dike-group’ that decides which project they wish to continue with. Among other things, they can decide how tall the dikes should be and how the bill for coastal protection should be distributed. Every landowner is responsible for protecting their property against flooding from the sea, and as a result, now only show great engagement in such group activities, but also have a vested interest in achieving an effective outcome. As part of Slagelse Municipality’s climate plan, it will support the project by conducting feasibility studies, while at the same time working actively to make local landowners aware of the possibility to participate in the physical work (“Højvandssikring Halsskov,” n.d.). For the sake of simplicity, this thesis will treat Halsskov as one area, however, it is differentiated, when different local views are presented.

Previous Research

This section will provide an overview of academic studies and report, which have already been written on the topic of resilience and its strategies to flooding. This can help to give a solid background; however, it is important to note that this review is not supposed to cover all aspects of the concept, but only those which are relevant to this thesis’ problem area.

There is a common consensus that solely applying traditional flood control measures is an insufficient response to handling with increasing risks of frequent flood (Restemeyer et al., 2015; Sørensen et al., 2016; Vis et al., 2003). Moreover, too little attention has been paid to the

repercussions of floods. Due to economic development, the possible flood damage has grown exponentially since the 1950's in the Netherlands (Vis et al., 2003). Vis et al. (2003) made a comparison between the present flood risk management policy in the Netherlands, which is based on a resistance strategy, by raising the dikes with equal safety levels along the lower Rhine River to prevent flooding, and two other resilience strategies that focus on minimising the consequences of these floods, while consequently allowing some controlled flooding like discharge via 'green rivers' and detention in compartments.

Prior to 1953, when a devastating flood from the North Sea took 1800 lives, dike heights were determined by the maximal registered water level. In reality, this developed into raising the dikes after each serious flood. After 1953, a more technical approach was adopted by creating an official safety level. The identifying of a safety level was delineated as the acceptable likelihood of flooding, or in simple terms, dike heights should surpass water levels correlated to a discharge with a certain flood probability (Rivierduken, 1977 cited in Vis et al., 2003). After years of debate, a safety level was selected for the entire area in the Netherlands that was subject to river floods: the discharge ability of the river should approve a safe passage of a discharge, which the likelihood of flooding is 1/1250 per year (Vis et al., 2003, p. 34).

There were two resilience strategies, detention in compartments and green rivers and they were compared with the present policy. The main idea of this strategy of detention in compartments is the regulated flooding of compartment in controlled sizes, hence confining the area and reducing the flood damage. Essentially, areas along the river are being specified for temporary water storage and separating the currently huge dike-rings (areas enclosed by a dike) into smaller compartments with various flood likelihoods (Vis et al., 2003). Green rivers, as another resilience strategy, also depend on regulated flooding and minimising the size of the flooded area. This is achieved by expanding the river's discharge capacity e.g. making bigger flood plain area and/or adding 'green rivers'. Green rivers are broad discharge compartments that have a high likelihood of flooding and are by preference placed in areas where the economic loss as a result of flooding is minimal (ibid).

Besides the damage from flooding, there have been other assessed criteria to allow evaluation of the flood management strategies. These assessed the two different strategies on their financial impacts (costs and damages calculated using mathematical models) and their effects on economy, ecology and landscape, and on flexibility. The total cost has been converted to a complete economic sum, necessary for implementation, operation and maintenance of the strategy. The results were that the early costs of the resilience strategies were great, particularly in the short

term, -while the return, i.e. the declined risk of flooding, was solely perceivable in the long term.

In the table 1 shown below, green rivers with natural and spontaneous process is especially costly with present value of 8 billion Euros, mostly because they demand large space and many changes in land use. The prices of detention in compartments and green rivers with multifunctional development are intermediate, with a present value of 1.6 and 3.0 billion Euros, respectively (Vis et al., 2003). If a dike were to burst in Nijmegen and Betuwe, this could cause an economic loss of up to 36 billion Euros. The present value of the possible flood destruction of the present strategy is, however, only 0.5 billion Euros, whereas the resilience strategies would result in lesser damage of 0.3 billion Euros for detention in compartments, and 0.1 billion Euros for the green river strategies (ibid). The main conclusion is that the flood risk management based on resilience is an adequate alternative to the present policy of growing resistance against flooding by increasing the height of the dikes (Vis et al., 2003).

Table 1 Effect matrix with scores on criteria for the various strategies.

Strategy	PV* of costs	Flexibility	PV of flood damage	Economy	Ecology	Landscape
Continuation of current policy	0.9	4.1	0.5	5.0	4.5	4.4
Compartments	1.6	6.7	0.3	4.7	4.1	5.3
Green river						
a. spontaneous development	8.0	4.8	0.0	4.3	7.7	6.6
b. biodiversity optimisation	8.0	4.8	0.0	4.4	8.0	6.6
c. multifunctional development	3.0	4.7	0.1	5.7	6.7	6.7

* PV = Present Value in billion €.

Table 1: 'Effect matrix with scores on criteria for the various strategies' by Vis et al. (2003, p. 38)

Nevertheless, resilience strategies are more flexible and allow more opportunities for nature and landscape development. The significance of these findings from literature is that they make use of the calculation of flood damage through the modelling approach. Important to note is that with this data and uncertain predictions of the long-term costs, inconclusiveness end results may emerge. The authors have not conducted a detailed uncertainty analysis, since they argue that the results are not employed in absolute terms, but to compare a number of various strategies (Vis et al., 2003).

Sørensen et al. (2016) also argue that the traditional approach to flooding like single-purpose drainage systems, dams, and dikes will lead to higher long-term flood risk and harm riverine ecosystems in urban and rural regions. Taking departure from theory of resilience, the researchers propose a concept of urban resilience, which highlights resilience, multiple stakeholders and an integrated approach, in which they elaborate and identify areas where society has to rethink and improve flood management. Some of the suggestions were designing open

water management measures in changing the infrastructure in flood-prone areas (see figure 2). It is an interdisciplinary initiative that demands a combination of technological and artistic means, and there is a need for new synergy between green and blue assets. Within blue-green infrastructure (combining green areas alongside water management), the urban flora and water management are integrated to preserve the ecological and hydrological assets in the landscape. In effective solutions, not only is the blue-green infrastructure supposed to weaken flood impacts, but also improve the quality and living standards of the urban milieu, such as better air quality, relief of heat and greater biodiversity (Sørensen et al., 2016).



Figure 2: Floodable areas with multifunctional use by Sørensen et al. (2016, p. 7)

Some common measures to develop and better the relations between the stakeholders prior to, during and following flood incidents are virtual reality, augmented reality and, in particular, GIS (Geographic Information System) (Sørensen et al., 2016). In terms of information sharing, GIS can be used in stakeholder planning for creating databases and analysing spatial data, as well as functioning as a useful tool for achieving learning across the organisational borders. GIS makes it possible to generate various types of analyses based on e.g., proximity and network; the software has the advantage of being terribly flexible, and allows for a plethora of input parameters, dependent upon the specific case or investigation. Moreover, the helpful visualisation ability of a GIS is very fitting for gathering knowledge and communication activities. As an outcome, various kinds of collective GIS-techniques have arisen, such as community mapping and participatory GIS; GIS is also employed and developed for enhancing (flood) risk management.

GIS has been used to classify interdependencies between local infrastructures (Johnson and McLean, 2008 cited in Sørensen et al., 2016), representation and simulation of infrastructure features interdependencies (Garavan and McCarthy, 2008 cited in Sørensen et al., 2016), and representing urban surface water balances (Wolthusen, 2005 cited in Sørensen et al., 2016). Joint accountability and admittance to databases and analysis results are crucial for efficient planning, as considered above. Some of the means to carry this out are by applying spatial data

infrastructure (SDI) that is accessible on the internet (Wolthusen, 2005 cited in Sørensen et al., 2016). SDI ensures that data supplier, including participatory data collection conducted by the civic society, provides information databases, which can be applied in the planning process, all the while contributing to awareness and protective measures. Importantly, web-based resolutions make it feasible for accountable partners, such as municipalities, to retrieve data and facts on a detailed level, and for society to receive current information, when and where required (Sørensen et al., 2016).

Lastly, Restemeyer et al. (2015) also share the same view on traditional flood measures and its inadequacy to address flood events. But they ask what resilience actually means and how it can be applied to an environment vulnerable to flooding. To investigate this, they developed a qualitative framework for assessing the flood resilience for two case studies in the city of Hamburg, after a devastating storm surge took place in 1962, flooding one sixth of Hamburg, leading to; 20,000 residents being evacuated, and 300 people losing their lives. The case studies suggest that motivation is not enough to change from traditional to more resilient flood risk management, because it must be integrated into a larger urban agenda, where it can create win-win situations. The way this investigation enriches contemporary literature on flood resilience is by elaborating upon the meaning of its three main elements; robustness, adaptability and transformability, and by pinpointing essential components to building resilience-based strategies.

In conclusion, the prior research on flood resilience has suggested that the traditional strategies are no longer a beneficial or effective solution to the increasing risks of flooding, seeing as we are no longer focusing on the immediate relieving of coastal flooding, but rather long-term preventative measures. Priorities have indeed changed over time, in line with the change of weather patterns and the climate. This thesis will thus prove useful in terms of contributing to how a relatively small and financially constrained municipality addresses the issues of coastal flooding, since most of the literature on flood resilience has been focused on large cities, or on a national scale. Similarly, there is a gap in the literature in terms of explaining how, the concept of resilience, can effectively be put into action.

Theory: A Strategy-Based Framework for Examining Resilience



Figure 3: Korsør City Centre (Vernisa Dedic, 2019)

This section presents the strategy-based framework that explains the concept of resilience by describing the nature and function of the concept.

Resilience Characterised by Robustness, Adaptability and Transformability

In my understanding, if a city wants to become flood resilient, it requires more than simple “robustness”, but also numerous researchers propose, other important characteristics of resilience, such as “adaptability” and “transformability” must be given attention (Davoudi et., 2012; Folke et al., 2010; Galderisi et al., 2010; Scott, 2013 cited in Restemeyer et al., 2015). Whereas the term *adaptability* means making improvements within the system to be less vulnerable, *transformability* is defined as a shift to a new system “when ecological, economic, or social structures make the existing system untenable” (Walker et al., 2004 cited in Restemeyer et al., 2015, p. 47). These three terms comprise important aspects of resilience, and they can be

applied to a city like Korsør that is at risk of flooding. Their definitions specific to the case of Korsør will be interpreted in the following way:

Robustness is when a city is able to endure flood incidents, for example, by building and maintaining dikes, sluices and storm surge barriers (Restemeyer et al., 2015). Nevertheless, drawing on experiences from flood incidents in Netherlands, Germany and even in Korsør, it has shown that merely being robust is not adequate. One must accept that flooding will occur which may submerge the dikes, which have been built as primary line of protection. Thus, adaptability is essential.

Adaptability means, in this context, that the land has adjusted to flooding, for example, in the case whereby a flood surge has occurred, though the land has not suffered huge destruction (Restemeyer et al., 2015). For this to be achieved, an adjustment of the both the physical environment and social sphere is needed. Efforts to strengthen the physical environment could be, for example, raising buildings and properties onto poles or stilts, thereby preventing the areas that have critical infrastructures from being flooded as much as possible (ibid). When defending and controlling the flooding, a social dimension to flood risk management is equally vital, and be achieved through educating citizens as to how to mobilise themselves and know how to save themselves and their belongings, after all, “changing the physical environment postulates a change in peoples’ mind-sets” (Restemeyer et al., 2015, p, 47). Flood risk management turns into a societal duty that requires cross-disciplinary cooperation (water management, spatial planning and disaster management) and also the participation of the citizens (Restemeyer et al., 2015). Only then can we talk about transformation, if both the physical environment and peoples’ mind-sets can be shaped.

Currently, *transformability*, can then be defined as the ability of a city to make an urged change from “fighting the water” to “living with water” (Restemeyer et al., 2015, p, 47). This can also be understood as moving from a “predict-and-control” position to an “integrated-adaptive regime”(Restemeyer et al., 2015, p. 47). The future prospects of flood events can give us new insights that will require demanded transformation. It is through transformability that the capability to change can be realised, because it focuses on a new awareness that seeks to find the most suitable way of addressing the flood risk (Restemeyer et al., 2015).

Ramifications of a Resilience Approach to Strategy-Planning

Recognising robustness, adaptability, and transformability as preconditions for a flood-resilient city entails certain ramifications for creating more effective strategies.

Firstly, acknowledging the fact that a resilient city, such as Korsør, demands a degree of robustness, means that efforts related to a resistance strategy (technical efforts e.g. dikes, dams, and sluices) still possess the capability to make a city more resilient, since such efforts offer immediate assistance during a flood incident. As a result, technical means can or have to be an implicit component of a resilience strategy (Restemeyer et al., 2015). Secondly, having a resilience approach entails a widening of responsibilities among public and private actors. Thirdly, transformability welcomes a distinctive understanding of responsibilities, as well as asks for scope to create knowledge and envisage creative solutions, while power, resources and public support are needed for the implementation (Restemeyer et al., 2015).

Thus, building flood-resilient cities can be a convoluted and demanding assignment. There is more to it than simply listing potential methods and strategies - the challenge necessitates establishing a work attitude conducive to having various disciplines work together, and for citizens to acknowledge their function in flood risk management (Restemeyer et al., 2015). Therefore, a broad view on strategy-making is necessary. It adopts a perspective that focuses on pinpointing and mapping out possible, concrete measures. Furthermore, it recognises that forming resilience is a long-lasting process that is contingent on circumstantial factors. Such a holistic outlook on strategy-making has been recommended by Hutter (2006 cited in Restemeyer et al., 2015) who argued that a strategy is a ‘multidimensional phenomenon’ consisting of content (what to do), context parameters (accustomed to internal and external conditions) and process (how to do it).

A Strategy-Framework for Evaluating the Flood Resilience in Korsør

The goal with applying the aforementioned framework for this thesis is to gain a better understanding of the nature of flood resilience. This will be achieved by taking point of departure in the terms “resilience” and “strategy” in order to establish an operational framework, as suggested by Restermeyer et al. (2015) for evaluating flood resilience and acknowledging probable strategies for building resilience. Based on the section above noting the ramifications of resilience, we can conceptualise the three aspects of strategy suitably for flood resilience. Appropriately, in the element of “content”, there is an emphasis on measures and political implementation hereof in order to withstand flood risk. In extension to this point, we will view

all main issues in “context” that determine the purpose of the selected strategy, as well as discuss the institutional structure and legislation as internal conditions, with the intention of uncovering how liabilities amongst the public and private collaborators are connected in a legal and organisational way. The element of “process” combines the idea of creating human capabilities between the public and private collaborators. From previous research on resilience and flood risk management, we can pinpoint efforts made and capabilities which are supportive of robustness, adaptability and transformability. As a result, the content of table below can be utilised to evaluate the resilience of cities, such as Korsør, that are at high risk of flooding.

	Robustness <i>'Reduce flood probability'</i>	Adaptability <i>'Reduce consequences of flooding'</i>	Transformability <i>'Foster societal change'</i>
Content Measures and policy instruments	<ul style="list-style-type: none"> - technical measures (e.g. dikes, dams, barriers) - spatial measures (e.g. river widening) 	<ul style="list-style-type: none"> - discourage vulnerable land use in flood-prone areas - flood-proofing existing buildings and infrastructure in flood-prone areas - warning and evacuation schemes - flood insurance / recovery funds 	risk communication and awareness raising among: <ul style="list-style-type: none"> - private stakeholders (e.g. brochures, public campaigns, early education in school) - public stakeholders (e.g. consensus-building, partnership practices, decision support tools)
Context Strategic issues, Institutional structure and legislation	<ul style="list-style-type: none"> - Water and climate: water as threat - strong public responsibility for water management - collaboration between water management and spatial planning on specific projects 	<ul style="list-style-type: none"> - Land-use and socio-economic changes: need to create synergies - shared legal responsibility public – private - strong collaboration between water management, spatial planning and disaster management on all projects 	<ul style="list-style-type: none"> - societal changes: need to establish water as asset - informal networks fostering a new 'water culture' - new interdisciplinary networks (e.g. 'think tanks') and learning organizations
Process Intellectual capital	<ul style="list-style-type: none"> - expert knowledge in engineering and planning 	<ul style="list-style-type: none"> - expert knowledge and local knowledge (vulnerability reduction and adaptation options) 	<ul style="list-style-type: none"> - creativity, openness towards new knowledge, learning
Social capital	<ul style="list-style-type: none"> - good relations among water managers and spatial planners 	<ul style="list-style-type: none"> - good relations among water managers, spatial planners and disaster managers; civil awareness and willingness to invest in flood risk management measures 	<ul style="list-style-type: none"> - mutual trust between public and private stakeholders and social acceptance of new interdisciplinary networks
Political capital	<ul style="list-style-type: none"> - strong political and financial support for bigger structures (public funds) 	<ul style="list-style-type: none"> - strong political and financial support for adaptation and a risk-based approach 	<ul style="list-style-type: none"> - change agents, leadership; financial support for informal and interdisciplinary networks

Table 2: Overview of the strategy-based framework by Restemeyer et al. (2015, p. 49)

Content – Measures and Policy Instruments

The definition of “flood risk” is the likelihood of a flood hazard multiplied by the consequences of that hazard (Jonkman, Van Gelder, & Vrijling, 2003), where the efforts and policy

implementation address either the first or the last part of the equation. Keeping in line with this definition, *robustness* addresses the first part of the equation, since minimising the likelihood of a flood incident can help the city to become durable over time.

Adaptability addresses the second part of the equation, seeing as reducing the consequences of a flood incident can determine whether or not the land is equipped for flooding (Restemeyer et al., 2015). Meijerink and Dicke (2008) state that it is possible to reduce the flood probability of an area by employing technical or spatial measures, including e.g. dams dikes, storm surges, barriers etc., and for the spatial it could be, e.g. widening the width of the river channel. Moreover, the consequences of a flood incident can be decreased by adjusting the current houses and infrastructure to become flood-proofed, as well as important discouraging future construction upon flood prone areas. Lastly, flood insurance and recovery funds can aid the residents financially to recoup quickly from flooding.

The perspective of *transformability* calls for the support of societal change; as previously mentioned, essential prerequisites for the physical changeover of a city involve the shifting of people's attitude and frame of mind. Woltjer and Al (2007) suggest that only close collaboration between water management, spatial planning, and disaster management can minimise the vulnerability of the city. In addition, flood risk management is no longer perceived as a solely public obligation, since property rights demand real estate developers and private house owners to flood-proof their properties themselves. Knieling, Schaerffer and Tressl (2009 cited in Restemeyer et al., 2015) conclude that well-informed citizens have a lower risk of being affected by a flood incident, as they are naturally prepared in terms of how to rescue themselves, and how to save their personal possessions in their homes, so that they are less destructed by flooding. Thus, there are various efforts focused on increasing awareness and empowerment of local citizens, such as through pamphlets, local campaigns and even information in school, all which may help to advance *transformability*. Correspondingly, amidst stakeholders, consensus-building and alliance-creation are equally important efforts, as well decision-support tools, which assist planners in terms of evaluating the flood risk in particular zones, and the integration of different fields in order to collectively create innovative resolutions (Restemeyer et al., 2015).

Context – Strategic Issues, Institutional Structure and Legislation

Circumstantial factors can describe why certain content and practices in strategy-making are chosen (Hutter, 2006 cited in Restemeyer et al., 2015). Population progression, the economic

situation, and even culture are broadly considered as important elements, when it comes to selecting strategies. For instance, a robustness approach is more inclined to be preferred if the water is perceived as a danger. Institutionally, this necessitates a capable water sector, and as well as effective cooperation of water administrators and spatial planners on concrete plans, such as creating more space and resources for water projects (Restemeyer et al., 2015).

An adaptive approach considers the need for land-use and socio-economic development to be important aspects. *Adaptability* requires a greater alliance of both sectors of planning and water management to flood-proof the land frontier along the coastline. This can also be articulated in regard to legislation, for instance, when flood risk is integrated as a formal element in the planning process. What is written in the legislation can also show whether flood risk management is merely seen as a public obligation, or where it accentuates a responsibility for private partners (Restemeyer et al., 2015). In any case, the ability to transform requires contemplation of long-term future scenarios and the need for a wider societal learning process regarding addressing water. Woltjer and Al (2007) call this as “new water culture”, where water is seen as a source of social coherence, networks and participation, thereby constituting a part of attractive living and working conditions.

Process – Intellectual, Social and Political Capital

The process can be viewed as capacity-building, because resilience largely concerns itself with who the other stakeholders are, and what sorts of capacities do they need to acquire in order to deal with flooding. Research on adaptive capacity of society (e.g. Gupta et al., 2010 cited in Restemeyer, 2015, p. 50) proposes that a flood-resilient city needs the ability from institutions and individuals in order “to cope with, adapt to, recover from and renew themselves after a hazard”. Thus, it is suitable to analyse the process as a matter of capacity-building. In the capacity-building literature, Khakee (2002) identifies intellectual, social and political capital for assessment of sustainable development. These criteria, with a bit of readjustment by relating to three terms of resilience, can also be applied to building flood-resilient cities. It is helpful to briefly describe how the terms are defined and understood, because they play an important role in building flood-resilient city.

Intellectual Capital

Intellectual capital refers to ‘knowledge resources’ (Khakee, 2002) made up by prior experiences, scientific examination and the understanding of citizens, places and issues. Moreover, it also

consists of new ways of looking at those issues, thereby sharing and developing knowledge, in order to ease the choices that people approve (e.g. Khakee et al., 2000 cited in Khakee, 2002). In relation to *robustness*, the intellectual capital requires a lot of professional expertise in technical engineering and planning. On the other hand, *adaptability* demands that specialists know about ‘vulnerability reduction and adaption options’ (Restemeyer et al., 2015). Additionally, local knowledge can be very valued when determining applicable and ‘socially accepted’ places for water detainment. *Transformability*, as a response, calls for creativity to create new and innovative resolutions; open-mindedness towards different ideas, with the goal of experimenting with them, and thus learning from them, is equally pertinent (Restemeyer et al., 2015).

Social Capital

Social capital is interpreted as ‘relational resources’ or ‘social network resources’ (Khakee, 2002) that facilitate cooperation between involved stakeholders to receive support and reinforce their capacity to agree on solutions and measures. It is essentially about the trust relation between actors, and is this often perceived as a synonym for ‘trust’. For *robustness*, having a good relation between water managers and spatial planners is adequate. Nevertheless, for *adaptability*, good relations are required between the flood risk management, as well as the need for high levels of civil awareness and readiness to take part in flood risk management (Restemeyer et al., 2015). Several researchers have highlighted that ‘social capacity-building’ requires a ‘local and participatory approach’, intended for empowered citizens, rather than the end-receiver of information (Kucklicke and Steinführer, 2013; Pahl-Wostl, 2006; Pelling, 2011 cited in Restemeyer, 2015). For *transformability*, reciprocal trust among public and private actors is called for, illustrated through taking part in, and establishing new cross-disciplinary networks.

Political Capital

Political capital is interpreted as ‘mobilisation capability’ (Healey et al., 1999 cited in Khakee, 2002), composed of support by policy-and decisionmakers in order to achieve a specific approach, or win economic funding. For instance, in relation to *robustness*, there is a huge requirement public funds to build and manage ‘primary defences’ (Restemeyer et al., 2015). Contrarily, *adaptability* focuses more on the political and economic backing for risk-based strategies, as well as citizens, who choose to install their own preventative measures. *Transformability* relies on financial aid for creating informal and inter-disciplinary networks. Furthermore, Gupta et al. (2010 cited in Restemeyer et al., 2015) suggest that supposed ‘change

agents' and leadership can assist in convincing various partners to participate and engage themselves in long-lasting visions.

In short, although resilience covers all three elements: robustness, adaptability, and transformability, these elements still seem to present themselves as being slightly paradoxical. For instance, how is it likely to gain a powerful water management sector and concurrently support informal networks? (Restemeyer et al., 2015). Essentially, I view this as a key advantage of the concept, namely because it can combine and incorporate these apparent contradictions. Undoubtedly, in some circumstances, some elements are more necessary than others, and for that reason can determine priorities within resilience. By way of this practical framework, this thesis will be able to identify the priorities, from for instance, the standpoint of Slagelse Municipality, as well as citizens, and assist in suggesting alternative efforts, institutions and capacities which can be applied to create resilience for the long run.

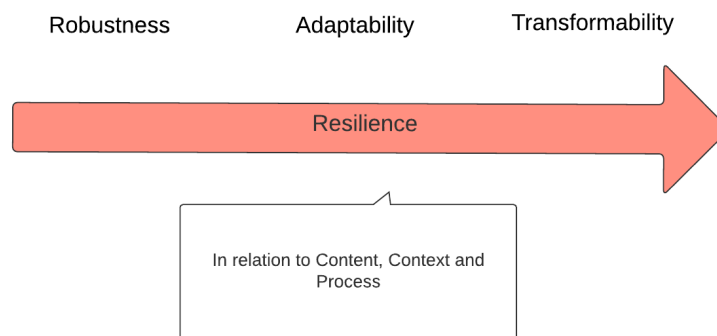


Figure 4: Visual representation of the strategy-based framework

Methodology and Methods



Figure 5: Halsskov near Storebæltsbroen (Vernisa Dedic, 2019)

This ensuing section seeks to provide the reader with an overview of methodological approach and method.

Research Design

This thesis makes use of a case study approach because, according to Yin (2003 cited in Baxter & Jack, 2008), a case study should be chosen when a) the purpose of the research is to answer ‘how’ and ‘why’ questions; b) you cannot manipulate the action of those who are part of the study; c) you want to examine the contextual circumstances that are related to the overall phenomenon and context; or d) the border between phenomenon and context is not apparent. In light of this definition, part c) is particularly relevant for my investigation, seeing as I plan on examining the contextual conditions in Korsør in relation to how resilience is being approached, and how this is relevant for the overall category of flood resilience. It is not feasible to look at resilience strategies without considering the context within which they occur.

Korsør has been elected as this reports’ primary case study and therefore constitutes my main unit of analysis. Miles and Huberman (1994, p. 25 cited in Baxter & Jack, 2008) defined a case as, “a phenomenon of some occurring in a bounded context” where the case is, “in effect, your

unit of analysis”. Within Korsør, I will specifically look at the area of Halsskov and Korsør city centre, where I shall carry out an in-depth analysis of how resilience is applied. I find it apposite to note a constraint regarding my analysis; my upcoming analytical data will be based on an interview, which was conducted with a citizen belonging to dike group 2. Yet, seeing as I cannot generalise his/her insights to the rest of the dike groups in Halsskov, it is important to be aware that the findings cannot speak for the rest of the area, but only for the one respective area pertaining to the interviewee. In short, my case analysis will be divided into separate sub-units, when and where appropriate.

Interviews with the employees at the municipality in Korsør will also be utilised. Furthermore, when interviewing the project leaders from the municipality, we referred to Korsør as either Halsskov or the city centre. This can be defined as an *exemplifying* case, whereby “the objective is to capture the circumstances and conditions of an everyday or commonplace situation” (Yin, 2009, p. 48 cited in Bryman, 2016, p. 62). Thus, this case has been chosen, since it exemplifies its wider theme, which is flood-resilient cities; by doing so, through the case of Korsør, we can gain tremendous insight into the problem and cause. The idea of exemplification suggests that cases are not selected due to their uniqueness or severity, but because they contribute to the broader theme of analysis and constitute a suitable context for the research question to be answered, this thesis’ being how resilience is understood and applied to flood-risk cities. The aim is not to generalise from the findings to other cases beyond this one, given that we are restricted in terms of external validity.

Semi-structured Interviews (Municipality vs. Citizen)

The first interview with the resident in Halsskov, and member of the dike group 2, was conducted on 6th April, 2019, and the second and third interview took place on 2nd April 2019. Of ethical reason, I have given them pseudonym since it will protect the confidentiality of the respondents, and consents were also given orally by my informants, before the interviews were conducted. Information obtained during the interview have reported truthfully and accurately without identifying the name.

The reason being why my first informant in Interview 1 had chosen to take part in the dike group is due to the fact that they previously lived in Jakarta, Indonesia, when a tsunami hit the country in 2004. The interviewee for Interview 1 did not live in the affected area as such, but he/she has seen how flooding can inflict such great damage. Therefore, he/she wanted to help Korsør from suffering such consequences, and thus decided to actively take part in the dike group.

The two project leaders for coastal protection management were present in my second interview. Interview 2 was conducted with, an environmental biologist, who and has worked for Slagelse Municipality since 2007, but concerning soil pollution and the environment in general, though has also 2-3 years' experience with coastal processes. Finally, my third interview informant, who has a background in Landscape Management, was included as a component of my data collection, since they also several years' experience working and studying local coastal processes. Table 3 gives a visual overview of my interview informants, as well when the respective interviews were carried out.

Research Method and Post-interview Considerations

I chose a *semi-structured interview* as the most appropriate method for this investigation's answering research question, primarily because this choice of method is compatible with my study's purpose, which is to examine resilience strategies as thoroughly as possible. My interviews have the capacity to provide a lot of useful information, as my selection of informants can explain in-depth how the process for choosing strategies has been. In advance, I had prepared an interview guide with the topics and questions that were to be investigated, but the interviewees were also given great leeway in terms of how to reply; this is a key advantage of the semi-structured interview method (Bryman, 2016). The questions were sometimes formulated differently from the interview guide, but with similar wording, and there was no chronological order in the conversations. Depending on the interviewees' replies, I would pose spontaneous questions that arose during the interview. I tried to make the interview process as flexible as possible by following the script to some extent, though also importantly allowing room for themes of great interest for the interviewee – especially in the case of Interview 1 with the resident. The form of the semi-structured interview guide is considered as loose, but still possesses the potential to achieve rich data for subsequent analysis.

No.	Interviews	Type of Interview	Interviewees
1	Interview 1, April 2019	Individual	Citizen, member of dike group 2 for a few years.
2	Interview 2, April 2019	Group (together with Interview 3)	Municipal project leader for Korsør City Centre.
3	Interview 3, April 2019	Group	Municipal project leader for Halsskov area

Table 3: Overview of interviewees

I managed to get in contact with my second and third interview informants from Slagelse Municipality, who are both project leaders, by sending an email regarding my investigation; the former is in charge of Halskov, and the latter is responsible for Korsør city centre. When I was interviewing them for 45 minutes, I tried to remain curious and less knowledgeable about the subject topic, because they both deal with flood resilience strategies on a daily basis, and thus must be regarded as field-experts. All interviews were conducted in Danish, so any quotes have been translated from Danish to English. It is also important to note, however, that it is not always possible to translate exact words, but rather focus on the content.

Following on from my correspondence with Slagelse Municipality, I then managed get into contact with a citizen from one of the local dike groups, area 2, through Facebook. The interview lasted for over an hour, yet there were occasional moments, where we talked slightly outside the scope of the topic. Nevertheless, it proved to be a very interesting conversation, because the informant revealed their genuine motivation for joining the group. It is a useful method for listening to the resident's perspective at this length of time, since such data is not covered in academic literature or official documents from the municipality. Generally, it was difficult to get hold of citizens, because I could not find their personal contact information on the municipality's website. I tried to search for their names on Facebook, where I contacted at least five potential respondents, two of which responded. I planned, therefore, to conduct additional two interviews, but one from a different dike group got cancelled on the actual day, as there was a train strike and the respondent did not have the possibility to postpone the meeting. I did manage to get hold of a different citizen's email address, where we could have developed a written correspondence, thus constituting an equally important data source, though unfortunately no reply came from them, despite their showing interest in this topic.

After conducting the interviews, the reflections were that it could have been interesting to hear perspectives from residents, who are not part of the dike groups from areas 1 and 3. Ideally, it would have been fruitful to hear representatives from each dike group after learning that they might experiences different dike-issues, due to different geographical landscapes. Moreover, my first interview informant claimed that there are no correspondence between the dike groups. Residents who are not part of the dike could have ideally been interviewed after realising that dike group do not represent the general residents. By doing so, I would have been in a position to understand why they are against the different measures proposed, and what would they have liked to happen, or what it would take for them to actively participate in the dike group.

Method of Data Analysis and Nvivo

The way the interviews were designed centred around answering this study's research question and thereafter breaking it into three questions that had to be covered, in order for the data to prove itself useful. The questions are derived from the strategy-based framework:

- How are different resilience strategies applied in the coastal flood risk management in Korsør?
- In what context do Slagelse municipality and citizens from the dike group address flooding challenges?
- How has the process been regarding finding solutions for increased water levels?

Naturally, under each main question, there were additional questions which were directed to either Interviewee 1 or Interviewees 2 and 3, such as whether it was easy for Interviewee 1 to recruit members for the dike group, and whether the municipality had experienced any hurdles throughout the decision-making process.

It can be quite an overwhelming task to analyse the audio-taped interviews, as they include such vast quantities of data. After recording and transcribing the interviews, I will make use of Nvivo, the computer software, as an assisting tool for analysing the qualitative data I have generated. Although the purpose of qualitative analysis is to transform the data into findings, no description of that particular transformation can be found (Patton, 2002 cited in DeNardo & Lopez Levers, n.d.). The biggest challenge is how to make sense of these large data by "reducing the volume of raw information, sifting trivia from significance, identifying significant patterns, and constructing a framework for communicating the essence of what the data reveal" (Patton, 2002, p. 432 cited in DeNardo & Lopez Levers, n.d., p. 2).

The objective of utilising Nvivo is to help ease the burden, as qualitative theorists (e.g., Berg, 2001; Denzin & Lincoln, 1998; Merriam, 2001 cited in DeNardo & Lopez Levers, n.d.) have advocated the use of qualitative data analysis software tools make for more productive management of data. The first step is to collect the data and transform them into text - this task is undertaken by me. Secondly, codes are identified, a process which is manually done through the Nvivo programme. The third step accounts for how the codes must then be formed into categorical themes. Fourthly, the gathered data are then organised using these categories. Thereafter, the data are carefully analysed in order to find relevant patterns (Berg, 2001 cited in DeNardo & Lopez Levers, n.d.). Finally, the identified patterns are examined in view of previous studies and theory, yielding small conclusion of findings (ibid). This is the technique of data

analysis implemented in this investigation, as will be demonstrated below in its upcoming result chapter.

Findings: The Outcome of My Research



Figure 6: Korsør City Centre (Vernisa Dedic, 2019)

This chapter presents the results of my research, focusing on the four key themes that emerged from processing the interview data. The framework by Restemeyer et al. (2015) will be used to interpret and understand the results in the following chapter. In terms of structure, this chapter will be arranged into four sections, one for each theme, where Interview 1 is separated from Interview 2 and 3, since this was an individual interview. The following themes have been identified based upon my interview data: Finance and Resources, Clash of Motivations, Rigid Bureaucracy, and Practicality versus Creativity.

Finance and Resources – Municipality and Residents Suffering Serious Financial Burden

Interview Informant 1 – The Resident

When it came to why technical, spatial or social measures had been up for discussion, and similarly why the dike group had chosen this particular course of action, my informant from Interview 1 answered:

“There were two things, where finance was one of them [...] And as I said, there are someone who are against paying a couple of hundred crowns per year to maintain it. So, you are not going out and asking for X thousands crowns to make cycle paths, throw a Storebælts-ferry at the harbour and have diving lessons. There had been many suggestions, but now we will probably have Denmark’s largest beach, because the dikes will extend the beach even further.”

The respondent carefully distinguishes the creative solutions separate being actual solutions for preventing flooding, especially when it comes to landlords’ own money. The secure and common solution concerns building dikes, where he/she describes *“dikes as being dikes. It is a form of insurance, you could say. It’s like driving a car and having your safety belt on. Well, a safety belt is a safety belt”*.

Speaking of frequency of meetings between the dike group and municipality, informant 1 revealed that municipal authorities arrange meetings with them when deemed necessary, and argued that you should view the construction of dike in two contexts: firstly, the planning phase regarding meetings, economic decision and areas of responsibility, and: the whole construction phase of the dikes and all of the suggestions that have been forwarded regarding technique and strategy. But, as informant 1 puts it, he/she explains the process of choosing the dikes as the solution:

“To begin with we started out by creating spectacular sandcastles and had an artist in mind, and there would be basketball courts, and there would be everything weird down there. But, gradually, as you found out, well, things cost damn money, and there is only this amount of money. Well, then it became the solution that we have now.”

So, although suggestions, such as an artificial island, beach volleyball and nice paintings on the bicycle paths and footpaths have been brought up for discussion, so *“the diversity of ideas has been unfolded, but, again, it all comes down to every single crown”*. It is obvious through this, that finance is an imperative element for deciding which solutions will be taken.

Interestingly, when asked what the most challenging part of the decision-making process was, and what had caused the greatest limitations, both in an organisational and practical way, informant 1 answered:

“I don’t see any challenges, because if we look at it slightly picturesquely, it is like holding a gun next to your head. It is not a choice, because there isn’t anyone with just 2 minutes of common sense who will not say no to this. Even if you are against it. You may be so much against it, both

for political and all other reasons. This is mother nature and she decides. It is completely indifferent to what you think. And what happens subsequently? It's the economy. What comes afterwards then for me as a landowner? And it is only further down the line that politics comes, if at all. So, it is not a question of choosing, promising, escaping, or is there another way out? No there isn't, because if the water comes, then the water comes."

Interviewee 1 sees this issue as an urgent case, because the nature seems to be careless about how residents perceive flooding. Nevertheless, he/she still consciously stressed the problem of finance and how it constitutes a huge obstacle for action to be taken.

Interview Informants 2 and 3 – The Municipality

In terms of capacity and geographical location, it was interesting to ask why they had only focused on Halsskov and Korsør city centre. Regarding to this question, the representatives from Slagelse Municipality explained how they were only working on four out of five specifically selected vulnerable prioritised areas, because they do not have the capacity to safeguard all areas, despite this claim, on their website, Korsør city centre and Halsskov are the only two areas mentioned. Subsequently interview informant 3 states that the official reason for focusing on Halsskov is to gain important experience working with a strategy of prevention, before they really start focusing on the city centre, *"because the case is more complicated."* Therefore, they have really indicated that Halsskov is the only active area they are working on, though could not provide any specifics on how Halsskov is more complicated than the city centre. They believe dividing the area into five subareas is beneficial, making for a clearer and more manageable solution as opposed to a one-time broad sweeping solution that extends many kilometres, but does not take into account the specific landscape properties, as they change along the coast.

On the talks of finance, interview informant 3 stated *"particularly, we have so many vulnerable areas, and it is the landowners who will be part of financing this, so it is also very limited to what we can do... it should not cost too much, and we have to choose the cheapest, best solutions, right?"*. Informant 2 added: *"well, if you start with experimenting, then it will take time, and like you talked about in the beginning, we are not even on it on all the areas, so it is also a question about resources"*. This is evident when my interviewees start to discuss their hopes for the centre part of Korsør being chosen as a pilot project by Realdania (a private association which supports projects in architecture and planning), meaning the landlords will not have to finance the project, thereby doing away with a challenging aspect of the project.

In terms of loans, informant 2 emphasised that landowners are responsible to coast insure their own house, though for joint projects, residents can take out a ‘municipal guaranteed loan’, whereby the municipality collects the money through property tax. Furthermore, I was told that in Halsskov, every landowner in one area has to pay 6-8.000 DKK, and if the amount is divided over 25 years, then in reality, it is not really much money they need to pay. There is also an area, which has to pay 19.000 DKK per person, though this is still affordable.

Regarding strategies used to minimise the risk of flooding, informant 2 answered that a number of strategies will be implemented for Halsskov, such as dikes, sheet piles, raising a road, the installing of boulders, as well as sand extraction. Whereas for the city centre, the solutions will probably be a combination of high walls and green dikes, although later on informant 3 mentioned that “*in the inner city, there is not a lot of space, so it would be strange to have green dikes going through the central part of town*”. They had also previously talked about having a ‘one-time’ solution in the form of canal lock, where both of them commented that “*but it would be expensive and it would not be possible, because some of the water comes from Storebælt, so even though you safeguard the city centre, you will still have problems with the northern part of town not being secured.*” It is clear how the mapping out and selection of suitable solutions is a difficult task; many of them are very technical, but also entail downsides for other areas along the coast, if they were to be implemented.

Along the same line, it was appropriate to ask whether the municipality is in charge of emergency management of the residents, however, informant 3 made it clear that “*all emergency belongs to the Danish Emergency Management Agency, and it is they who control all that. [...] the way we are involved is having contact to the established dike groups [...] basically we just play a mediating role in the municipality. But all things related to evacuation belongs to the disaster management team. It will always be they who decide and control it.*”

Even though the municipality are not responsible for the evacuation, they can instead warn people to protect their properties. The only campaign they have considered to educate people on this matter is through announcing to residents the importance of remembering to apply for permission to protect their property from the coast, “*so they [residents] just don’t build something out on our beach*”. They stated that the majority of them know that they live in a vulnerable, lowland area.

Prior research uncovered how there are only dike groups present in Halsskov. On this subject, I asked my informants as to what would be done with Korsør city centre, seeing as there are no

resident-based groups: informant 3 answered that “*we had had the dialogue with locals, but it was a bit different, like with local councils, professional associations, fishing harbour and marinas [...] there is not an actual dike group per say, as there is in Halsskov, because the city centre is a bit different, a bit more complex organised*”. The respondent stated that in Halsskov, there are housing buildings, homogenous areas etc. where the city centre has more occupation and retail, so they have involved these stakeholders, instead of having concrete groups of residents. But, interestingly, informant 1 mentioned that there are huge differences between areas within Halsskov itself. Since interviewee 3 mentioned about the complexity of the city centre, it was appropriate to ask about how often she would contact those stakeholders, with the following answer being offered:

“Well, now the project has been still for the whole of 2018, and now we are going to start up again. And yes, they will be involved again, but right now there are some other tasks that we need to initiate. In reality, there are other stakeholders that we need to get into contact with, such as energy supplier [SK Forsyning], our entrepreneur-service and emergency agency and so on; we need our planning department and we need to be in dialogue at the moment”.

Although Halsskov and Korsør city centre are the main focus areas, Korsør city has been on standby and needs to do the groundwork before proceeding to building the dikes.

Sub-Conclusion

In summary, finance and resources have a major influence on which strategies are being employed in relation to flood management in Korsør. Interviewee 1 highlights how flooding is an urgent environmental consequence that has to be dealt with right now, but money is the factor that decides what is possible, in the end, especially when the finance is primarily fronted by the residents. The challenge lies in the fact that the economic means are therefore limited, as a result, limiting the possible solutions. Dikes seem to be presented as the most secure choice. Interviewees 2 and 3 also mentioned technical solutions for Halsskov and Korsør city centre, where the former will consist of dikes along the beach and the latter will consist of high walls and green dikes. The municipality only has the capacity to address two out of five identified vulnerable areas, and the city centre project has been on standby for the entirety of 2018. Due to high levels of vulnerability and finance coming from the residents’ own pockets, they are constrained to find the cheapest and “best” solution for flooding, so there is no need for experimenting, seeing as only a few of the vulnerable areas can be addressed anyway.

Clash of Motivations – Disagreement between Dike Group and Landowners

Interview Informants 1,2 and 3 – The Resident and Municipality

My first informant, the resident in the dike group 2, is the main respondent to discuss the issue of clash of motivations; therefore, the following section will be rooted primarily in his/her account with, very few references from interviewees 2 and 3.

When asked about the motivation behind being part of the dike group, interviewee 1 answered:

“The municipality says that I am predisposed to flooding from the beginning. So you can say, well what is that about, what is happening, should I be for or against, and I quickly realised that there is no reason to be against. You can actually be against all you want, but you are not getting anywhere because it is easy for the insurance to say, well then we will not insure your house, and if you cannot insure your house, then you cannot sell it, and then it will be worthless. It is like choosing between pest and cholera, and those hearing meetings we have attended, are actually funny, because those who are against, they are really against. They are really against, I mean 8.000 kr. at once per person, if you can borrow that and pay back over 30 years, oh no that is not good. So, there are some special people over there on the street just behind who are really against that they need to be part of paying.”

Despite clear resistance and reluctance outside of the group, interviewee 1 explains that there is no one in the group of just six or seven, who actively are against. The members are really direct towards those who are opposed and roughly speaking *“those who are against are sort of real proletariats. They just want to be against just for being against”*. The respondent forwards an example, where a person is against the installing of dikes, because he is not allowed to leave his boat lying on the beach, and with the dikes he would have to drag his boat off the beach and move it to his garden. Interviewee 1 asks rhetorically *“whether you want to drag your boat and row in the sea or would rather row in your own living room when you have flooding?”*. When talking to informants 2 and 3 about the possible relocation of buildings, they pointed to a long-term plan over the next 100 years, justifying no further development upon certain flood-prone areas; nevertheless they remark that a problem lies in the fact that moving buildings in land *“is hard, because water attracts”*. They have reached a dilemma, because the municipality is constrained by what can be done within the law and what is legally permissible, these factors need to be taken account: *“there is the dilemma that you do not have your view removed or*

changed, you don't want a dike on your property and one of the other, there are so many things that come into play".

Furthermore, informant 1 explained how only dike groups receive the flood-warnings and it is their duty to then warn others and tell the neighbours that the electricity may go out etc. They also assume similar information is sent out to areas 1 and 3, but they have no real knowledge of this, or communication with them because the coast is very different, depending on whether you are at the harbour (area 1), at the beach (area 2) or at the old berth near the cliff (area 3). Not all areas are equally vulnerable to flooding. My interview informant 1 moves on to tell: *"they [other dike groups] don't get wet feet I am pretty sure, and they are mad about having to take part in paying for the dikes, because over there is high ground, and there are pretty big differences in area 1, 2 and 3. We are not on the same level."* So, although the areas have varied coastlines, they still have to pay for the same solution. A major theme uncovered by speaking with my dike-group resident is the feeling of injustice and unfairness. This may be a sign that the municipality is treating all residents equally, even though there are key differences in where they live, which are being overlooked or ignored.

Speaking of the inclusion of residents, informant 1 mentioned that there had been small sessions to discuss how the dikes would look and where to place them. They had, in fact, invited people from the surrounding area, but only a few souls came to contribute and take up the task. Moreover, the informant mentioned that dike group for area 2 has experienced the most negative outcomes from hearings.

"There was a hearing meeting where all the plans had to be approved [...] all the residents in area 2 were invited. By far, most of them were positive, but Kruusesvej was probably the road which had the most negative residents on it. Also, they haven't ever really experienced flooding; they are not born or raised here. They say no nothing will happen."

People do not seem to be too worried about the power of water, but informant 1 emphasises that *"we are talking about a hundred year occurrence happening before the year 2050, with a height of 2,70 m - this does merely make your feet wet. If the water continues to rise, then we need to raise the dike, that is the nature of the case"*. The residents are downplaying the seriousness of potential flooding. The respondent also mentioned that if they receive no complaints from other fellow residents, then the dikes can potentially be a reality in two years.

Interestingly, I am also told how no one is interested in moving from their homes, especially those along the coast who are at highest risk; they have not made changes to make their house

protected from flooding. The residents seem to all be aware of the danger, but they are irritated that dikes will be put up. There is clearly a divergence of opinion between certain residents and the municipal employees, who have opted for this strategy. Nevertheless, informant 1 and fellow group member performed a visual experiment as a tool a few years back, where they put sticks marked to indicate how tall the dikes would be, and it turned out that they will not destroy their view of the ocean at all; many residents were positively surprised at this. My interview respondent highlights how he/she uses insurance as an argument for people, who are against losing their view.

In addition, my informant makes it very clear that none of the local residents can argue that they did not know or were not prepared for the risk of water level rise, as a result of global warming. He/she puts it in the following way: *“you can choose to believe it, or you can choose to let it be, or you can choose to ignore it. Those who doesn’t believe in it or ignore it, they will probably learn it the hard way. Otherwise it will be their own problem.”*

Sub-Conclusion

To summarise, this section, which has dealt with the topic of a clash of motivations, has demonstrated how different interests between the residents and dike group have hindered the process of reaching a solution for preventing floods. Interview 1 provides an elaborate description of the nature of resistance regarding residents having to pay for the dikes, though the dike group is trying to convince them that the total cost of financing the dikes will be less than total damage cost, when the next disaster strikes, and the insurance will not cover it. The respondents from Slagelse Municipality also acknowledge the dilemma of helping the residents, and not taking action in terms of developing any further dikes near residents’ homes, thereby saving their ocean views; it is difficult for them because water attracts people to live in these areas, and some residents are unwilling to move to higher ground away from the coast. Furthermore, Interview 1 also revealed that dike group area 2 do not have any communication with the other dike groups from neighbouring areas. In fact, other groups are not content with the fact that they must take part in paying for the dikes for other different coastal lines outside of their area. Despite the possibility of resident participation, it only takes one complaint or objection to stop the dikes being built. In short, as can be gleaned from this part of my interviews, the residents are aware of the long-term consequences of potential high sea level rise, but problem is that they simply do not want the dikes in their backyard.

Rigid Bureaucracy – Preventing Development of Dikes

Interview Informants 1, 2 and 3 – The Resident and Municipality

When asked about the relationship between the municipality and external partners, Interview 1 revealed how the dike group only has contact with NIRAS (engineering consultancy company) and the Emergency Management Agency, an institution which the resident maintained to be part of Slagelse Municipality. Despite this, informants 2 and 3 have not been able to confirm this. The member of the dike group certainly has a positive view of them, since he/she personally knows some of the members of the agency, who do their utmost, whenever they are needed. Indeed, informant 1 makes it clear that they are in support of the municipality and suggests that citizens are the ones to blame for not cooperating. Further into the first interview, new themes of law and bureaucracy are uncovered as the main obstacles for preventing the building of the dikes. In informant 1's own words:

“We must follow all these rules and laws regarding civil rights, e.g. hearings. And it just drags the time out. Basically, the dikes could have been standing there today. But because you have to apply for this and that, they are not. We have even applied for funding through Mærsk, but were not granted. [...] And then a complaint comes that you need to deal with and then there has to be a new plan, right? And the project gets pushed back all the time. But you cannot point the fingers at the municipality. It is the citizens themselves. It is the fault of the private actors, who are responsible for paying, SK Forsyning are bandits. TDC also constitute some of the bandits. They do not want to pay though. So, it has to be done through force [...] The telecommunication companies do not want to pay anything at all. And then there will be quarrels with the municipality. [...] So, the private actors, those big companies are, in reality, the worst when it comes to paying, because they do not want to.”

It is important to mention that TDC provides communication through phone and broadband for the television, which can result in upsetting many citizens, especially when the grey boxes that stand outside of residents' homes are not covered by TDC in the event of flooding. Moreover, SK Forsyning is a utility company that provides electricity, heat and water.

In terms of responsibilities amongst the citizens, municipalities, and engineers as external actors, my first informant confirms how residents possess sole responsibility for their own residence, whereas the municipality is responsible, in partnership with the citizens, for the dikes. In the case that flood waters flows above or around the new dikes, then the insurance company will only

cover the expenses if the residents and municipality can prove that they have followed the expert advice of the engineers, for instance NIRAS.

Regarding political support for what residents in dike groups do, informant 1 believes that Slagelse Municipality does not really have a genuine interest in matters concerning coastal protection. He/she answered:

“I think, they [politicians] have had many fights in the city council, which have taken on too great a role to allow them to be interested in something called dikes. So personally, I am very happy about the municipal employee 2, because she is very competent and she knows what she is talking about. She is a good support, though, of course, she cannot continue to be like that, because we have to stand on our own two legs, and this is what we need to do next week”.

Interview 1 reveals plainly how politicians do not seem to really be interested in this project, in contrast to what is mentioned by informants 2 and 3, who argued that local politicians follow the project closely.

It is important to know whether the municipality discourages people from moving to flood prone areas, or warns them about building areas, which are prone to floods. Informant 2 added: *“Actually, it says in the municipal plan that you just need to take location into consideration, so it is not like: you cannot build here”.* He/she continues, stating that people can ask for permission for building new houses, if the municipality makes flood protection or erosion protection, before the houses are built. They do not really go into much detail in regard to how this should be taken into consideration, other than explaining that if you carry out urban development you need to make sure you safeguard the area against one hundred-year occurrence.

Sub-Conclusion

In conclusion, a rigid bureaucracy within Slagelse Municipality are argued to be a key reason for delaying the implementation of dikes. Although there is a clear assignment of responsibility between stakeholders, informant 1 places the blame on the residents who are not part of the dike group for delaying the process. This theme is not the most prominent one during the data analysis, but it is certainly worth mentioning. According to the same informant, too many applications, and time spent addressing complaints during hearings, have contributed to dragging out the process. If the hearing receives just one complaint you cannot continue to the next stage of dike buildings, until it has been dealt with; often it can take months to make a new dike plan. Lastly, but importantly, telecommunication and utility companies are less likely to foot the

payment of damages they may incur as a result of flooding, thus leaving huge bills for the residents.

Practicality Versus Creativity – Dikes Merely Seen as Defenders and Non-integrative

Interview Informant 1 - The Resident

As discussion naturally progressed, an additional, yet essential theme I wished to discuss with my first informant was the actual nature of the dikes; have they been designed as a long-term solution, considering more frequent storm surges, as well as higher average sea water levels? In response to what will happen one day when the water goes beyond the dikes, informant 1 stated:

“If you ask Donald Trump, nothing will happen. There are no problems with the environment. And like you said, it rains, and winds blow more often, and if it were March, this would have been the wettest month ever. I think you should take it very seriously. If the water spills over the dikes, then we have a problem; we must lift our feet, so we don’t get wet toes. And then we must get going, filling up the sandbags that are at disposal”.

For them, it is about preventing as much damage as possible, *“because if it happens tomorrow, then we are all being foolish [...] and believe me if it turns out that the dikes were not tall enough and water spills over by 1 cm, then there will be a big argument about this with the municipality and engineering companies. That’s how it will always be. We are talking about something as fickle and unpredictable as nature.”*

If interviewee 1 could choose, would he/she still prefer the dikes as the ultimate solutions, or he/she would ensure that other alternatives were also available, commenting:

“If you could forget the dikes... that’s actually a funny thought experiment. And let nature take its course, you can say. Then it requires whole other initiatives, where they are not just local - so it becomes a global project, then we are talking about CO2 emission and all that stuff. Then we would need to go back to green lifestyle, and do we want that? Shall we bike to Thailand or fly to Thailand. We are so leisurely, when it comes down to it.”

The respondent does not see any solution other than dikes, provided we still wish to maintain our current way of living in Denmark, and believes we have to completely shift our mindset about flooding:

“We live in a world where stability is an important thing. You have to be stable in your work efforts, so we produce all the time to live here or somewhere else. So, the whole mindset needs to be completely rethought if we have to forego the dikes. If you are looking at the world map from space in the middle of the night, where do you see most lights? The coasts. People live on the coasts. Look at New York, San Francisco [...] they are also at risk of high-water rise. How do we prevent that? There are only two ways: either you stop polluting or make a dike. I think we are making the dikes, because it is easier than not polluting. We are just talking, but do the opposite. That’s why it is called dikes and not an alternative for the alternative, it will be too demanding that I don’t think you would be able to find one single politician... but we must get to the situation, where we watch an American disaster movie, where it all ends with the president standing and saying that we must not repeat this disaster. Here, we must get to. Otherwise nothing will happen. Since we have the knowledge and technique that allow us to build our way out of the problem, so that’s what we do. Practical and easy versus arduous.”

The question of whether the dikes can constitute a long-term solution, was similarly answered in depth by informant 1, who responded *“dikes can be excellent. I don’t think that dikes can be a static entity. It is a dynamic entity that can be built up, and there will be a time, where the poles melt, and the water level will rise by 7 metres. We get our feet wet by just 40 centimetres above sea level. So, until that day comes, where we only think about the dikes and not basic needs. What will it take? A big disaster? I think the latter comes first. The disaster comes first before the paradigm shift. [...] not before half of Korsør is under water.”*

Interview Informants 2 and 3 – The Municipality

Both my informants from the municipality had spoken before about how Halsskov had already in the 1990s begun to think about coastal protection, but when the subject was repeated about why no measures had been taken, informant 3 replied: *“I don’t think measures were taken, because you didn’t experience it [flooding] that often. Yes, well, there is an old dike from the 1800-hundreds or so. So, for them, dikes have been used for a long time, but perhaps due to different reasons than now. In relation to strategy changes since 2006, I asked whether there had been any factors that they up until then had not taken into account, Interview 3 answered:*

“... I would say that climate change plays more of a role, right? [...] That is something we are trying to deal with now through these preventative measures; is it even at all enough? [laughing]”

Regarding forced relocation of coastal buildings to higher ground, interviewee 2 added that it is difficult to change the pre-existing infrastructure in the city, seeing as *“schools, libraries and all*

that. It is not just that easy to move small houses”. Making big changes can disrupt the usual everyday life, and such changes will likely affect all residents within the coastal area.

Since the municipality confirmed that they would be restarting the project, perhaps this is indication that they have thought about new, innovative or even radical ideas to implement a more creative solution, despite being financially constrained and requiring permission from the Coastal Authority. Informant 3 answered:

“No, we can give permission to ourselves, but still, the solutions must be ones, which we are certain they will be able to deal with the situation. So yes, it can be exciting to do some innovative work and test it out, but we need to be clear that when the next disastrous event occurs, it must be able to keep the water out. So, it is a need of balance.”

And got disrupted by informant 2: *“it is the landowners who pay for this. We must not experiment with some new, exciting solutions”.* It shows experimentation is out of the equation when it comes to financing.

Since they are using dikes as the main strategy for tackling situations, where water is perceived as the key threat, this is a sign that the municipality is distancing itself from the water, instead of integrating water into the city, and making it an identifying part of Korsør. Interestingly, this is an idea, which the local council had considered before. Informant 2 commented:

“Well, we have had this discussion a couple of years ago, where there had been talks about ‘Venice of the North’ in Korsør, and how the water should be welcomed into the city. But we walked a bit away from it because, what can you say, big thoughts, and it is a port city. Well, there is water in and around the city, so the thing with purposefully taking water in to the city and making designing other solutions as an alternative just didn’t make any sense in the bigger context. We even made a rainwater basin, but the best solution is simply moving the water back out to the sea immediately. We have 120 km of coastline, so it is not here, we should play with these thoughts, but probably inside Slagelse city, which is far away from the coasts; it is more interesting to play with water and implement into the city environment.”

Furthermore, my second informant explained that it is very expensive to run the Venice project by leading the water away from the city, and there is a counterweight of, how much you do get back in terms of added value? So, although they previously tried to think creatively and outside-of-the-box approach, consensus prevailed amongst the authorities, highlighting how in a Danish context, it did not make any sense.

So far, it is the traditional solutions they are using, because *“we are yet to see any untraditional solutions that actually work”*. Informant 3 became slightly irritated at these questions, answering:

“If you really look into the box, then it is maybe also there, where the gold is hidden, and not outside of the box. It is just that one sometimes thinks that you have to go completely away from the traditional way of doing things in order to find a good solution, but it is also very often the case that the good solutions lie in front of you. And if we have to develop something new, then we could, but there is no one that... they just want a solution. And they just want to be reassured, so that they can sleep better at night, not thinking about the risk of flooding - they just want a quick solution. But I think that we are offering something that is pretty good and solid.”

Informant 3 added: *“and you also have to keep in mind that alternative solutions often require a lot of staff and resources”*. Moreover, keeping on the same subject, the second informant added, *“we are always keeping ourselves updated as to whether there are any new projects in different areas; the thing that we need to ensure is that whatever the solution, it must be technically sensible. Although it may look smart, it has to work effectively on the day.”*

Both of the municipal employees explained how they have an expectation that it is the advisors they have hired, who in reality must figure out the feasibility of alternative solutions, because it is the municipality as authority body, who makes the decisions. The municipality has the responsibility for what actions and ideas are permissible, and it is also they who, in the end, decide how it is going to turn out.

Sub-Conclusion

Concludingly, this dichotomy of practicality versus creativity revealed a contrast in connection with how to deal with flooding. It is seen as a unique issue, as you are forced to either go for traditional and familiar solutions, or relatively unconventional and unknown ones, but perhaps a with a higher long-term probability of success. Informant 1 still prefers the dikes as the ultimate solution otherwise, people would have to completely change their way of living. Similarly, he/she sees this rather black and white, as either to stop polluting, or to build a dike that can prevent as much damage as needed, if disaster were to hit tomorrow. Dikes are seen as practical and dynamic, rather than static, because you can add layers; nevertheless, there are acknowledgments of how they can be a problem, if they cannot withhold the water. The key argument forwarded by the resident of the dike group is that a huge disaster will have to occur, before the paradigm shift can take place. Informants 2 and 3 even questioned whether dikes would be enough to deal with the flood risk, doubting the ability to keep all residents safe in such an event. They are

unwilling to look into other solutions, unless they are completely certain that they will actually work. The reason is that the majority of the funding stems from landowners' money, so it cannot easily be used for experimentations, and dikes are the quickest solution to deal with landowners' concerns and have been proven to work before. Practically speaking, they have argued it is better to just get rid of the water back out to sea, due to the great length of the coastline, as well as the fact that mass-relocation of current buildings would be far too overwhelming a process. The municipality confirms that it will stick to traditional methods, because they have not yet seen in reality how untraditional solutions can work. Moreover, out-of-the-box solutions also require extra resources and staffs.

Discussion: Assessment of Flood Resilience in Korsør



Figure 7: Halsskov beach (Vernisa Dedic, 2019)

This chapter will start by reiterating this study's choice of research question: **How is the notion of resilience understood and to what extent is it applied as part of flood risk management in Korsør in Slagelse Municipality?** Thus far, my findings, based on my interview data, have indicated how resilience strategies are present in Korsør through technical measures, such as the implementation of dikes. However, lack of finance and resources, clashes of motivation, bureaucracy and the dilemma of creativity and practicality are the main factors responsible for resilience not expanding to surrounding communities, as well as why alternative solutions other than dikes, have not been chosen. In order to answer the research question, the upcoming chapter will now move onto interpret the data, in doing so, trying to better understand the content, context and process of the project.

Content - Measures Applied to Minimise Flood Probability

The flood risk management is built upon the concept of *robustness*, as well as a couple of elements from *adaptability*. Employing the traditional approach to flood risk management would indicate an additional elevation of the dikes. The planned dikes, erosion protection and sand extraction in Halsskov, in addition to the high walls in Korsør city centre, which will be

continuously heightened and strengthened, are the solutions that have been accepted to deal with the flood risk, as suggested by the interviewees.

Dike Problematisation

The construction of dikes has not yet begun, but these remarks corroborate the findings of the previous work by Vis et al. (2003), where the Netherlands also chose to raise the dikes after each serious flood event, but, in the end, had to select a safety level, which was to be probability of flooding is 1/1250 per year. Slagelse Municipality has chosen a 100-year occurrence threshold, seeing as sea level rise is predicted to carry on for a little while yet, due to climate change. Despite this threshold, indicating that flooding bad enough to exceed the dikes would only happen once within a 100-year period, the probability of surpassing the crucial state during a time of 50 years is 40 percent. In addition, the unreliability with recurrence periods, on the basis of available data, is immense, and so lends no real confidence to this probability (Chocat et al., 2004 cited in Sørensen et al., 2016).

Furthermore, there are also certain drawbacks to determining such a safety level and resistance strategy. According to de Bruijn and Klijn, 2001 (cited in Vis et al., 2003), only one threshold is implemented for the entire area, insinuating that all land use types, such as cities, agricultural land and nature reserves, have the equivalent likelihood of flooding. What this means for Korsør is that it is unknown, which area will be flooded first, simply by using one safety level as soon as the threshold is surpassed. Since all areas have, in theory, an identical likelihood of flooding, an enormous area must be evacuated, even though this will likely be unnecessary. The resistance strategy contributes to a faulty sense of safety, which is demonstrated by continued large investment being made in the areas in Netherlands (Vis et al., 2003). Additionally, this reflected in Korsør, where the residents put more investment into the area by making it a more attractive place to live near the coast. Lastly, the present strategy creates a constant demands for heightening and enhancing the water defence structures, thereby limiting the natural dynamics of a river system and worsening the natural landscape characteristics, such as scenery and cultural heritage (Vis et al., 2003). Interview informant 1 revealed how some landowners would be frustrated and indeed very dissatisfied, if the dikes were built so as to obstruct the scenery from their house. Despite this, dikes have still been chosen as the main solution, the reasons for which have been presented previously. There are also some vital reasons for why certain solutions have been viewed more favourably than others. One unanticipated finding was the significant role finance and resources play in the case study of Korsør.

The measures to minimise flood probability are mostly dominated by *robustness* and *adaptability* aspects in resilience, with varying extents of success in application. Within robustness, dikes are the main approach to preventing flooding, but the catchment area is not yet physically ready for a storm surge. In the case of a storm surge spilling over the top of the main dike, warning and evacuation schemes exist and are to be executed by the dike groups, whose responsibility it is to warn the rest of the residents within the area, without going into specifics. This is considered to be the adaptability dimension of resilience.

Moreover, flood insurance is guaranteed, if the residents follow the advice provided by the experts. In terms of flood-proofing their homes, this is only vaguely formulated, given that we cannot know how many have followed the procedure for appropriate building, nor whether residents have flood-proofed their current houses. Loans are provided for joint projects, but these still do not change the fact that many residents are unwilling to invest in dikes, despite their being aware of the flood risk. The adaptability aspect of resilience aligns with a previous study in Hamburg, where even though the dikes were raised, the city also prepared for the worst-case scenario, i.e. if a storm surge were to exceed the dike line (Restemeyer et al., 2015). It has not been possible to obtain more in detail about the evacuation schemes and procedures for Korsør, besides that the Emergency Management would be responsible for providing sandbags and sending warnings to the dike groups. However, more initiatives should be implemented, such as distributing yearly storm surge information sheets to households containing advice and important contact information in case of emergency, as well as maps identifying safe areas, areas that will be warned, and areas that will be evacuated. In addition, there could also be emergency shelters put up, and bus stops could be utilised as meeting points, when there are evacuations, just as Restemeyer et al. (2015) suggested.

Types of Infrastructure in Korsør

Since the cost of land is high, the Halsskov area should be multifunctional and include elements of blue-green infrastructure, and it is important to approach the water challenges early on and integrate location-specific drainage solutions, such as those suggested in the figure 4 in this study's previous research section. Sørensen et al. (2016) believe that the integration of water into planning is an important element regarding flood resilience in order to improve the spatial and economical assets of the use of water, as well to support the city against increased sea level rise, and enhance overall municipal resilience to stormwater. As the same scholars suggested, my first

interview respondent from the dike group also highlighted how the flooding incidents pose a threat to infrastructure, which can flood buildings, obstruct roads, and even have serious societal repercussions for sensitive infrastructure, such as electrical and IT systems, which may be completely shut down. In this context, it becomes clear how paramount it is for planning to be aware of sensitive infrastructures by especially protecting them by containing the damage, thereby making sure it does not spill over to destroy any critical systems all residents are dependent upon.

Lack of New Solutions

It is argued that the approach of Slagelse Municipality to resilience in terms of concrete measures does not have any, or perhaps only very few elements of *transformability*. There are no schools that talk about flooding. The water planners in the municipality have only considered a campaign for remembering to apply for permission to protect property, but no great detail concerning the format is mentioned, or whether such efforts would be categorised as a distribution of information. Admittedly, the municipal employees have proven that they have considered a new water culture, yet, in practice, it did not make sense to change tactics, largely due to an unwillingness from the residents, and a lack of finance; they have even less financial means to cover the costs of new solutions. Therefore, distance is created to innovative planning, instead of integrating them into municipal strategies, seeing as they are too expensive and their success would be uncertain. These results seem to agree with those found in the case of Hamburg. In recent years, the city has tried to combine flood risk management and urban planning with a ‘compartment system’ and a ‘dike park’. Although these two ideas were opening up to the concept of ‘living with water’, the compartment system would entail a much more radical and physical change to the landscape than the dike would. For this reason, though discussed, the compartment system has been officially declined by the policy-and decisionmakers, and will not be incorporated into Hamburg’s future urban development plans. According to an involved researcher in the project:

“Back then, the idea was considered to be inadequate ... Many people did not understand that the goal was to lower flood risk and offer chances for urban planning at the same time... That they would still be protected – but according to the concept of resilience, not resistance. Most people still associate flood protection with huge walls. However, smooth transitions between water and city are better since they also improve the risk awareness among the population (Restemeyer et al., 2015, p. 53).

In the context of this comment, it does not yet seem possible to integrate urban planning with water management. If the current policy in Slagelse Municipality does not change soon, the possible erosion or collapsing of dikes may end in catastrophic damage to the city. As will be discussed in the following section, it can pay off to employ such strategies instead of maintaining the dikes as the sole main measure.

Context - Institutional Structure and Legislation

The municipality's choice of measures, as well as dealing with objection, are elements, which can be explained by examining the institutional structure. Although dike projects can improve the relation between project planners and residents, inter-stakeholder collaboration is still very much limited. There is a huge discrepancy of willingness between the dike group and the rest of the residents, who stubbornly refuse to take part in the facilitating of the dikes. Unfortunately, it would have been very insightful to understand why this is so, hearing their own attitudes, yet the interviews did not contain residents who fell into this category. Again, it is considered that *robustness* is the main structure at play, because water is perceived as a considerable threat, thus constituting an urgent case; this consequently affects the solutions which are designed to secure the catchment areas serving Korsør. Despite this, an aspect that the framework does not stress enough is the essential role of finance. The economic dimension of such a project has a huge impact on which strategy will be chosen, because one is limited to elect the cheapest and still the "best" solution in this context. So, it boils down to a matter of resources, with the only stipulation other than financial feasibility being the fact that the solution chosen must not disturb the usual daily life for residents, or drastically change local buildings and infrastructures.

Assessing the Effectiveness of Flood Prevention Measures

There is a significant difficulty regarding the execution of successful flood prevention measures. Though the infrastructure is linked, the responsibilities, possessions, and areas of expertise are frequently divided amongst the stakeholders involved in the process, thereby increasing the challenges, which act as obstacles to acquiring a holistic overview and a common understanding of what must be achieved. In a Scandinavian context, adopting a holistic perspective to planning is often perceived as the most optimal and democratic approach. Such challenges, however, lead to more complication through the fact that information regarding infrastructure can be a delicate matter and thus cannot be publicly discussed.

Furthermore, the separate responsibilities constitute a challenge regarding carrying out cost-effective solutions, because cost and effect can be divergent for different stakeholders and

systems. For this reason, there should be a necessity to form shared priorities and purposes together amongst all the stakeholders (Sørensen et al., 2016). It is emphasised by the interviewees that there is a clear delineation of responsibility for the residents relating to finance and meetings, and the only external collaborations are with a utility company and an emergency management team. There had been a number of complaints during the meetings that had delayed the construction of the dike. Moreover, there have even been disagreements amongst different dike groups regarding the responsibility of the citizens to pay for the dike along the coastline. Again, my efforts pertaining to this thesis have covered several attempts to reach out to other dike groups, but they chose either not to respond to my emails, or the contacts were unavailable. It is suggested that the actors must deepen their knowledge about how flooding can impact the infrastructure in affected areas and in what way the impacts may unfold from one system to another. These solutions must be considered in cases where it is viable to demonstrate and visualise how vulnerable and unprotected the infrastructure (and urban areas on that matter) is to flooding, and thereafter in cooperation with each other analyse the repercussions flooding may bring for Korsør. The analysis can be improved and processed by explaining the susceptibility of the various infrastructures, their interdependencies, and its main purpose with the help of GIS (Geographic Information System) which Sørensen et al. (2016) have explored, and so this comprises a very real possibility for Slagelse Municipality to explore technical solutions to gain a greater advantage in terms of dealing with flooding, as the council already makes use of GIS.

Redistribution of Responsibilities

In terms of *adaptability*, there is no shared legal responsibility between public and private stakeholders. There have been issues with utility company SK Forsyning and telecommunication company TDC, so, the context has not been adapted to the situation. Flood risk is considered in the planning process in a way that the houseowner must apply for permission to build or extend. Furthermore, an added issue is the fact that it seems today that many new houses have been built near the coasts, as well as on well-known flood plains. The water reserve and water plant are possibly the closest local institutions to be subject to increased flood risk. Nonetheless, the water sector cannot be assumed to deal with the difficult issues singlehandedly. In order to find cost-effective results, both public and private stakeholders need to work together, and each must take responsibility in order to minimise the damaging consequences of flooding.

In regard to the water sector, it seeks for measures which incorporate water management into a broader planning system, such as land-use planning and transport systems, as well as looking positively upon solutions, such as blue-green resolutions to managing stormwater and flooding.

The task of controlling flood levels must be executed on the local level, and therefore this would call for differentiated and flexible measures, such as assigning responsibility to other sectors, through which they can be encouraged to look for cross-sector collaborations, when and where relevant (Sörensen et al., 2016). If this approach is to prove successful, there must be a need for sterner central government regulation, because opting for a decentralised system is less straightforward. Thaler and Priest (2014 cited in Sörensen et al., 2016) have researched the outcomes of flood management plans in England concluding that, e.g. the economic efficiency did not grow as a result, but that this, in lieu, has given larger costs due to a lengthier decision-making praxis (Sörensen et al., 2016). This is very similar to the findings from my case study of Korsør, only that the decision-making process has mostly been delayed by the residents, who are opposed to the dikes, despite their being aware of the risk, and being away of the fact that no other tangible solutions have been considered. This is very interesting, as the municipality stated that the residents just wanted a quick and simple solution.

Innovative Solutions Seem Too Risky

When there is no scope for *adaptability*, then it is often unlikely to transcend into *transformability*. The most likely proof of such transformability in Korsør, though it was not realised, is the example of the municipality having considered a new water culture; nevertheless, practically speaking this did not make sense for the municipality, due to its lack of practicality and doubts as to whether it would be worth the money. Therefore, the local authorities have preferred to keep their distance from such strategies, as opposed to adopting and integrating them. For this reason, it has not been possible to foster a new innovative solution, nor envision long-term futures. Vis et al. (2003) have attempted to calculate costs for changing from traditional to resilient strategies, as examined earlier. These estimates have illustrated that prolongation of the present strategy can result in exceptional flood damage, whereas the resilience strategies would end in less damage. Despite this, Slagelse Municipality could also consider performing similar calculations, which would open up different possibilities, instead of just dikes, seeing as the majority of residents are not part of the dike groups, and the final decision regarding the dike was voted down.

Process – Intellectual, Social and Political Capital

The transition from ‘fighting the water’ to ‘living with the water’ seems to be complicated, and in this investigation’s efforts to better understand the problem herein, examining intellectual, social and political capital can help to provide more clarity.

Robustness

Robustness can be found in each of the three forms of capital listed above. When inspecting the elements within intellectual capital, projects demand high amounts of expert knowledge regarding technical engineering, and how to design prevention measures for flooding. Project managers from the municipality have affirmed how it is the advisors' responsibility to come up with alternative ideas, and not the municipality itself.

When moving on to look at social capital, it seems that there is good relationship between the project managers and spatial planners from NIRAS, with such ties being strong enough to be satisfactory for the two stakeholder groups.

In terms of political capital, there is the possibility to publicly fund projects through taxes, specifically pertaining to the construction and maintenance of defences. However, there is no political capacity to address all affected areas at once. According to the representative of the dike group, there did not seem to be any real political support available, which is contradictory to what was otherwise stated by the project managers from the municipality.

Adaptability

Within *adaptability*, intellectual capital can be found in the way local knowledge is valuable for identifying appropriate, and to some extent, socially acceptable areas for water retention. Moreover, in social capital, the residents have good relations with disaster managers, although we have only been presented with one perspective; there is a lack of civil awareness and willingness to participate in flood risk management, despite the local and participatory approach. This was particularly exemplified through the boat story. Building dikes can raise questions about the will of the residents to finance municipal-driven projects. Also, there has still to this day been no involvement of citizens in the securing of Korsør city centre. In political capital, there are not many people who are willing to invest in precautionary measures, which will benefit themselves.

From the study of Hamburg, some of the water managers viewed the dike as multifunctional, though in reality this is unnecessary and insignificant, since it only adds extra costs; "I know a lot of water managers that say 'We want a dike as a dike, without extensive usage, because this is the best way to protect the city and its people.'" (Restemeyer et al., 2015, p. 55). This maybe also demonstrate why the compartment system was ruled out. The multifunctionality of the dike is criticized, as dikes are argued to only have one job, namely, to keep the waters back. This shares a similar sentiment with the project managers from Slagelse Municipality since they argue that dikes should only have one purpose, namely security. A researcher from the Technical University in Hamburg explained the reason:

“There is still a rather low openness towards new ideas... The reasons are manifold, mainly reflecting the “entrapment effect” i.e. the reluctance to change the current “known” practices and accept something “new” and as such “unknown”. There is much concern about how those changes would fit into the existing legal frameworks and the internal rules and responsibilities established within and between institutions” (Restemeyer et al., 2015, p. 55).

Taking the steps to adopt a holistic resilience approach, based upon the elements *adaptability* and *transformability*, is not only difficult for the public stakeholders, but equally so for the citizens. It is not only the municipality’s duty to assess flood risk management, but it also requires the affected residents to take precautions within their own means; however, as we have experienced through this thesis process, not so many are inclined to do so. Two studies about risk awareness in Hamburg (Heinrichs and Grunenberg, 2009; Knieling et al., 2009 cited in Restemeyer et al., 2015) reached the conclusion that “the most people are actually aware of the flood risk, but that the awareness does not translate into taking one’s own precautionary measures” (Restemeyer et al., 2015, p. 55). In fact, this sums up exactly what was revealed in my interview with informant 1.

Transformability

When examining the nature of *transformability*, intellectual capital is scarcely present. There is little openness or tolerance towards new ideas, or testing and learning from such ideas, as a result of a lack of finances, as well as a lack of impact and willpower. Perhaps dikes are still not a bad option for the time being. They do not see dikes as a fixed measure, but rather dynamic, because height can be added, even though this cannot guarantee no flooding. As my first informant commented, disaster must come before the paradigm shift. Dikes are thus still a good solution within the given context, and there is no need to think outside of the box to solve the problem at hand. In addition, in social capital, there is no mutual trust between the public and private stakeholders. In this case, such stakeholders are represented by the residents and utility and telecommunications company. People still have the same mindset and way of living. In political capital, there is no financial support for establishing informal and interdisciplinary network. There is a dilemma between the attraction of living near the coastline and the risks that are inherent herein. In general, it has become patently evident how this municipal-driven endeavour requires far more resources and staff. Sørensen et al. (2016, p. 5) concluded Mathur’s recommendation, who examined the flood and sea level rise for Mumbai in India, by citing that the waves should be perceived “as a friend rather than an enemy from which to be protected”.

To sum up, even though there is a consensus of opinion locally for protecting the coastline, the public authority, residents, as well as private stakeholder, are hesitant and seem to be unwilling to transition from measures of robustness to a more adaptable approach. That is not to say that such a transformation is not unachievable, but merely that is not realisable at the current stage. . This is mostly due to social and political capital acting as obstacles. Resilience in flood risk management in Slagelse Municipality contains almost all aspects of resilience; robustness and adaptability, though no element of transformability. Though this may seem a bit contradictory, in the case of Korsør, robustness, and to some extent adaptability, have shown themselves to be the most important aspects, and as a result, have hinted at different resilience priorities.

Conclusion: Can Dikes save Korsør from Drowning? – Yes, but Not Permanently



Figure 8: Halskov area with summer houses (Vernisa Dedic, 2019)

All in all, this thesis set out to assess the flood resilience strategies in Korsør – more specifically, Korsør city centre and Halskov. Through having answered the research question, *‘How is the notion of resilience understood and to what extent is it applied as part of flood risk management in Korsør in Slagelse Municipality?’*, I am now in a position to present the most prominent conclusory findings that can be drawn from my analysis. Findings have shown that the technical measures, which are usually seen as elements of a resistance strategy, are contradictory to a resilience strategy, since robustness and the ability to withstand a flood incident, are inherent features of resilience itself. In addition, the municipality and the dike group place more emphasis on evacuation procedures, and preparation and improving communication prior to future flood event, rather than preventative action. This thesis has demonstrated how, through the case of Korsør, the components of *robustness* and *adaptability* for implementing resilience strategies are present, though the element of *transformability* is evidently lacking; this may show itself in the near future. Through the findings, lack of finance and resources, an unwillingness of some residents to accept or take part in dike groups, rigid bureaucracy in the sense of a long and tedious

decision-making process, and the differentiation between creativity and practicality, a topic on which the interviewees diverge in terms of opinion, there would seem to still be several major obstacles standing in the way of the instalment of dikes.

However, it is worth noting that, since this thesis is based on a small sample of representatives, it is not possible to make generalisation for all areas of Korsør. Some voices have not been heard, such as representatives from other dike groups, or people who are not actively part of the groups, such as ordinary local residents. If their opinions had been heard, this may have even changed research findings. New and potential research topics have arisen as a result of this study, which may be worth exploring in the future, into to understand the problem on a more profound level.

- Financial capital should be looked into in greater depth, as should social, intellectual and political capital, since this investigation has illustrated how important finance and resources are when determining which solutions are feasible and worth considering. A resilient approach is often associated with higher cost, so this aspect of financial capital should strengthen the need for synergies with other fields, meaning flood resilience should not be seen as a separate single policy, but rather become integrated into a broader agenda regarding urban planning.
- Further research is needed to clarify to what degree, public authorities can set the boundary for making final decisions and possible collaborators, especially when the residents cover costs and efforts for flood protection. This can require a reallocation of responsibilities between public and private actors.
- In addition, another potential research topic could focus on how to make communities more resilient by improving communication between the representatives and residents who are not actively engaged. This may then bring us closer to understanding what it takes to motivate the residents to participate and help improve their situation.

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Appendices

Appendix I: The transcript of interview with Interview Informant 1 April 6th, 2019

Interview 1: Min indblanding i diget her i Korsør er, at vi alle sammen fik et brev om og beskrivelse om, at nu skulle der ske noget, og det koster penge. Jeg er sådan indrettet, at jeg skulle godt vide, hvordan fanden mine penge går til. Ikke så meget [*inaudible*], så jeg stillede op en blandt meget få til at være en del af Korsør digelavgruppe nr.2. At vi faktisk er kommet så langt nu at på onsdag den 9. april, der skal vi oprette digelaget den som... Det er lag som skal stå for vedligeholde økonomien og alt de der ting. Selvfølgelig er det via kommunens skatter, eller hvad hedder det ejendomsskatten, at det hele bliver taget fra. Så det skal nok gå alt sammen.

VD: Kan du huske, om du fik invitation til digegruppen i 2013, det var vist der, de blev oprettet?

Interview 1: Åh det er jo lang tid siden, men jeg har været med fra starten af og havde et enkelt lille bræk på nogle ganske få møder, hvor jeg ikke kunne deltage grundet, at de lagde møderne kl fire om eftermiddagen, og jeg har to timers transport for hver vej hver dag, så jeg kunne simpelthen ikke nå at deltage. Men der har [Interview 2] været virkelig flink til at få skubbet møderne også, fordi jeg er ikke den eneste som ikke kunne deltage på det her tidspunkt på døgnet.

VD: Så din motivation for at være en del af digegruppen, er, at du gerne vil se, hvor dine penge går til, altså det er sådan set jeres ansvar...

Interview 1: Ja, men også at du får jo lidt af en våd klud i hovedet, når du får at vide, at din ejendom lige pludselig er en del af... altså jeg synes lidt, vi ligger lidt væk fra stranden, der er 700 meter derned ikke. Men det er ikke så meget den vej, det er måske mere den anden vej, der er lidt farligt, siger de lokale her. Kommunen siger, at jeg er disponeret for oversvømmelse fra starten af. Så kan man ligesom sige, jamen hvad er det her for noget, hvad sker der, skal jeg være for, skal jeg være imod, og jeg fandt hurtigt ud af, at der ingen grund til at være imod. Du kan faktisk være imod alt det, du vil, men det kommer du ikke rigtig nogen vegne af, fordi det er meget nemt for forsikringselskaberne at sige, jamen så vil vi ikke forsikre dit hus, og hvis at du ikke kan forsikre dit hus, så du heller ikke sælge det, og så vil det være værdiløst. Det er ligesom, du kan vælge mellem pest eller kolera, og de høringsmøder, vi har været, er jo meget skægt fordi dem som er imod, de er fandme imod, og de er virkelig imod, og jeg mener "8.000 kr på en gang, om man kan låne det og betale tilbage over 30 år, uha nej det er fandme ikke godt". Så der nogle specielt herovre på vejen lige her bagved [*points at one direction*], som er rigtig meget imod, at de skal være med til at betale.

VD: Så hvor er i gruppen cirka, taget i betragtning at folk ikke kan komme til møder eller dukker sjældent op?

Interview 1: Vi er 6-7 stykker.

VD: Det er ganske lidt,

Interview 1: Det må man sige.

[...]

I asked about if their group had a common vision/goal

Interview 1: Der er ikke nogen i gruppen som modarbejder. Tværtimod så er vi meget kontante over for dem som er imod og sådan groft sagt dem der er imod, er sådan rigtig proletare. De er sgu imod for at være imod. Vi har en, der er imod, fordi så kan han ikke have sin båd liggende vel på stranden. Sådan en gammel robåd ikke, og du må ikke have dem liggende på digernes for at ikke at beskadige digerne. Så han skal altså bære sin båd og flytte den hen over for at få ind i sin have, og det kan jeg godt se, at det er da lidt irriterende, men hvad vil du helst? Slæbe din båd og ro ud i Storebælt, eller vil du ro inde i din egen stue, hvor du har fået oversvømmelse?

VD: Hvor tit er det, at I mødes med hinanden?

Interview 1: Det bestemmer [Interview 2] sådan set. Hun indkalder til møder, når de er der. Selve digelaget, du skal ligesom se det i to kontekst. Den her kontekst, som vi er ved at lave nu, som vi skal til møder om endnu, det bliver den der fremtidige, og det bliver den hvor der er noget økonomisk ansvarlighed og noget driftsansvarlighed osv. Og så det hele med konstruktion af diget, alt de forslag, der har været. Altså til at starte med var vi ude i at bygge flotte sandslotte og havde kunstnermalere over, og der skulle være basketballbaner, og der skulle være alt mulige mærkeligt dernede. Og efterhånden som man fandt ud af, jamen tingene koster sgu penge, og der er kun så og så penge. Jamen så blev det så til den løsning, der er nu.

VD: Skulle også til at spørge, hvilke tekniske, rumlige eller sociale foranstaltninger har der været op til diskussion, og hvorfor I har valgt bestemt på den her måde?

Interview 1: Der er to ting i det. Det ene det er selvfølgelig økonomien. Der er de penge, der er. Hvis du vil have noget andet, jamen fint så kan du godt få det, men så skal vi tage lommerne selv. Og som jeg siger, der er nogen, der er imod, bare at de skal betale et par hundrede kroner om året for at holde det ved lige. Så skal du nok ikke gå ud og bede om et X antal tusinde kroner for at lave et eller andet cykelbane, bådbane, kajbane eller hvad fanden, de nu har været fremme. Smide en storebæltsfærge ned i havnen og lave dykkerkurser og fanden ellers altså... der har været rigtig mange forslag fremme, og det er fine forslag, som man kan gøre. Nu får vi nok Danmarks største strand hernede pga., vi får et kæmpe stranddække ud, så stranden bliver jo, du kan fandme nok se det fra storebæltsbroen, når det kommer. Hvilket i øvrigt også har kommet en masse frustrationer, fordi Gud nu kommer hele Danmark til at være på stranden.

VD mentions about also water sports centre and beach park

Interview 1: Vandsportscentre, det blev ikke til noget. Det bliver heller ikke til noget.

Interview 1: Jeg troede, du tænkte på det vandland man havde tænkt sig at bygge ude på den anden side af motorvejen, der har der været planer om.. [Inaudible, but understood this as not being realistic]. Altså Korsør er altså... Vi har ikke engang en Fakta for helvede ikke. Vi mangler kun at lukke kirken nu ikk', og så er det slut.

VD: De idéer, som I har snakket om, er det så mest diger, I kommer frem til, er der andre løsninger, I har tænkt?

Interview 1: Det var jo en... altså diget er diget. Det er nu en sikring, kan man sige. Det vil ligesom at køre en bil og tage en sikkerhedssele på. Altså en sikkerhedssele er sgu en sikkerhedssele. Der er har været snak om at lave kunstig ø, beachvolleyball, verdensmesterskaber og fine tegninger med cykelstier og gangstier, og vægge, som man kunne lave på og gentagne kulturelle kunstneriske konkurrencer for alverdens kunstnere osv. Så mangfoldigheden har virkelig været udfoldet, men igen så kom vi til kroner og øre.

VD: Jeg tænker bare, at diger er en langsigtet løsning, hvis man ser på hyppigere stormflod og forhøjet vandstigninger. Hvad sker der når den dag, at vandet går over sine diger. Betaler det sig? Er det langvarigt?

Interview 1: Hvis du spørger Donald Trump, så kommer der ikke til at ske noget. Der er jo ikke nogen problemer med miljøet. Og som du selv siger, det regner det lidt oftere og blæser lidt mere, og var det marts måned at den var den vådeste måned nogensinde? Jeg tror, man skal tage det ret seriøst. Hvis vandet løber over digerne, så har vi et problem, må vi løfte fødderne, så vi ikke får våde tæer. Og så må vi se at komme i gang med få fyldte de vandsække, der er.

[Shows me a message where Interview 2 warns him a potential water rise via email]

VD: Skulle også til at spørge, om I får en slags kommunikation, hvor I modtager varsler.

Interview 1: Interview 2 sender dem kun til digelaget. Det er kun os i digelaget. Så er det vores pligt at advare alle mulige andre [...]. Jeg går selvfølgelig, når man snakker med naboerne derinde, så fortæller vi dem det, at det går ud over strømmen osv ikk'. Og så Kenneth [*other member of the group*] og de andre, de tager måske mere nært, ligesom tættere på vandet. Så men igen, jeg formoder, at det også bliver sendt til område 1 og 3. Det kender vi ikke noget til, vi snakker ikke med 1 og 3. Dels fordi, at selve kysten er meget forskellig i forhold til, altså et, det er inde i havnen, og to det er her ved stranden, og tre det er ude ved det gamle færgeleje, hvor du også har klinten derude. De får ikke våde tæer, jeg er helt sikkert, og de er sure over, at de også skal være med til at betale, fordi der edderme højt deroppe. Så, der er meget stor forskel på område 1,2 og 3, og derfor så er vi forskellige... vi er ikke på samme niveau, om man så må sige i forbindelse. Jeg tror faktisk, at vi her i gruppe 2 af dem, der har været længst tid om at komme

frem til resultatet. Og vi er også dem, der har flest høringssvar af negativ karakter, som skal behandles. Der blev indkaldt til høringsmøde sådan hele planen skal godkendes. Så vi mødtes alle sammenovre i kulturhuset, som ligger lige herovre. Alle beboerne i område 2 var inviteret. Der var faktisk pænt meget fremmøde. Jeg tror, der har været omkring 70-80 mennesker til mødet. Langt det overvejende del var selvfølgelig positive men Kruusesvej som løber lige bagved, det var nok dem, som var mest negative omkring det. Også de har aldrig haft oversvømmelser siger de der ikke nogen af dem, der aldrig er født eller opvokset hernede. Så de siger, nej der kommer ikke til at ske noget. Vandet har måske heller aldrig været så stigende, som de måske kan komme nu, og det er frem til 2050, vi snakker om nu. Så vi snakker om et 100-års hændelse frem til 2050 gør, at vi en højde af 2,70 ikke skulle få våde fødder. Stiger vandstanden mere, jamen så må man bare forhøje diget, det er sagens natur.

VD: Og det var det I præsenterede foran kulturhuset om digerne langs stranden?

Interview 1: Ja. Alle tegninger var lavet og fine.

[showing drawings]

VD: Har I skulle også flodsikre jeres hus? Jeg har set huse ned langs stranden, som har forhøjet deres altan. Har nogen folk ændret deres hus, eller måske fraflyttet?

Interview 1: Ikke mig bekendt. Tværtimod, dem som bor dernede, de har på ingen måde lyst til at flytte. De er virkelig klar over faren, men de har på ingen måde lyst til at flytte. De er irriteret over, at diget kommer op men som Kenneth i øvrigt sagde, at nu må i tage jer sammen. Hvis du forestiller at du sidder i køkken helt nede ved stranden de første rækker i huset. Du sidder i køkkenet og kigger ude på storebæltet så tilsvare det altså at, diget vil fjerne det samme som vindueskarmen. Så du kan stadig kigge ud af vinduet, du kan stadigvæk se det samme, og du kan stadig kigge ud over vandet. Så det lyder værre, end det egentlig er. Man siger, Mange af dem som 'nå er det ikke andet'. Kenneth og jeg var nede på for nogle år tilbage for at sætte træpinde, hvor vi malte rødt på træpinde, så folk kunne se jamen det er her det går til. Så meget visuelt i øvrigt ret stærkt stykke værktøj. Her kommer der til at være, og det bliver så højt. Så det er sted kom 'Nå er det ikke andet'. Så det var positivt, må man sige.

VD: Men der blevet gjort nok for opmærksomhed, at der kunne være risiko for vandstigning.

Interview 1: Absolut. Der er ikke nogen, der kan med retfærdighed kan sige, hvis vi får en oversvømmelse, at det vidste vi ikke, eller vi er ikke klar til det. Men det er jo så en anden historie. Absolut vover jeg at påstå, vi er i den grad blevet adviseret om, at det er altså noget, der kan ske. Og vi bliver tudet i ørene fulde hver dag af nyheder og alt mulige steder om miljøet er altså i forandring og menneskeskabt. Du kan vælge og tro på det, eller du kan vælge og lad være, du kan vælge og ignorere det. Dem der ikke tror på det og dem der ignorerer det, de kommer sgu nok til at lære det på den hårde måde. Og det bliver så deres problem.

VD: Vil du sige, at der har været nok omfattet borgerinddragelse?

Interview 1: Altså borgerne er inviteret. Men om de kommer, det er så en helt anden historie. Vi har haft forskellige små sessioner om hvor vi haft noget vi skal snakke om. Er det smart at diget går sådan her eller gå sådan der, eller det smartere at køre hele derhen og køre derhen i forhold til nogle områder, som bliver brugt prokreativt af en af villavejene længere nede. Der har vi været ude og invitere folk, og det er altså desværre ikke alle, der kommer heller ikke dem, hvor man rent faktisk bor på den pågældende vej. Så der er nogle ildsjæle, som bærer det her. Og jeg vil tro, vi er max fem i område 2, hvor resten er, de betaler bare hvad end de vil det eller ej. Det tal bygger ud fra alt de møder der har været, mødet med beredskabsstyrelsen, som ikke rigtigt have noget med digelaget at gøre, men hvor beredskabsstyrelsen siger, hvis det sker, så skal vi gøre sådan, så skal vi være der, så kan vi få sandsække der osv., altså de der planer foreligger allerede. Det er også en del af hvad kan man sige beredskabsstyrelsens at vi rent faktisk udsender varslere, at nu er der forhøjet vandstand.

VD: Hvordan er forholdet mellem kommunen og de evt. eksterne partnere?

Interview 1: Altså vi har kun kontakt til NIRAS og beredskabet. Beredskabet er jo også på en måde en kommune. Det er nogle heftige drenge. Nu kender jeg et par stykker af dem privat, og de er nogle fantastiske mennesker, som dels brænder for deres arbejde men også de er der sgu lige med det samme. Der var noget langt inde i Slagelse kommune noget flod der var ved at løbe over. De er jo afsted med det samme og har styr på det, man må sige. Der er ikke en finger at sætte på hverken kommunen eller på private aktører. Man kan sige der hvor... og det er så mig og min holdning. Det er ikke nødvendigvis [inaudible] retning, men det ville det være rart at den mulighed var der. Vi er nødt til at følge alle de her regler og love som der nu engang er omkring borgerrettigheder, altså høringer. Og det trækker bare tiden ud. I bund og grund, kunne diget havde stået færdigt i dag. Men på grund af, at du skal ansøge om dit og du skal ansøge om dat. Vi har også søgt penge hos mærskfond, og det har vi så ikke fået. Men altså igen, alle de her faktuelle ting som man skal igennem og ansøge og alt det, og der skal gå så lang tid før altså en klageperiode... Og kommer der bare en klage så skal de behandles og skal der være ny ikk' og det bliver skubbet hele tiden. Men det kan du ikke pege fingre af kommunen. Det er borgernes selv. Af de private aktører, som skal være med til at betale, og der er SK forsyning det er nogle af banditterne. TDC er nogle af banditterne. De vil ikke betale jo. Så det bliver en tvang simpelthen. Teleselskaberne vil slet ikke betale noget som helst overhovedet. De er fuldstændig ligeglade. Så det bliver slagsmål med kommunen. De der grå bokse, som står som gør at du kan snakke telefon og at du kan se fjernsyn. De er ejet af TDC. De vil ikke betale. Men du kan selv regne det ud, så kommer der halvanden meter vand, så står de under vand, og så dur de ikke mere. Så der ligger noget slagsmål der. Så private aktørers så er de store firmaer faktisk i virkeligheden det værste når det kommer til at de skal betale, de vil det ikke.

VD: Ser i vandet som en fordel eller trussel?

Interview 1: Når du køber et hus, så smider du altså ret meget. For at komme derhen til, har du været igennem et beløb.. spare penge sammen. Og når du har så købt dit hus, så er det ligesom ikke at bo hjemme hos mor og far eller bo i lejligheden, hvor du bare ringer til udlejeren og siger

fix det. Du fikser det. Du betaler det. Og det er ikke bare økonomi. Det er også ej jeg har malet mit hus selv, Jeg har lagt nyt tag på og hvad fanden jeg har ikk'.. Det er en beskyttelse af din bolig og ikke kun se med det økonomiske view, men det her er sgu mit det her, det er noget som jeg emotionelt er bundet op på af et eller andet grund. Og min personlig holdning er, at jo tættere du kommer på de boligejere som er tættest på vandet, jo større er det følelse af, at det er mit og her er dejligt. [...] Vi elsker at gå ned på stranden. Jeg er født og opvokset i Brøndby. Vi skulle bare havde boet her i et år.

VD: Så ligger der en klar ansvarsfordeling mellem borgerne, kommunerne og fx ingeniørerne.

Interview 1: Ja, og ansvaret er selvfølgelig, at du selv har ansvar for din egen bolig. Kommunen vil have ansvaret for sammen med digelaget. Og hvis diget brydes, jamen så er vi ude i alt de her stormflod altså alle de der forsikrings ting og sager, men der er jo forsikring der komme ind og dække udgifterne. Kvg at du som beboer og kommunen har fulgt de ekspertråd som eksempelvis NIRAS har lavet.

Interview 1: Den lokale viden og der mødte viovre på storebæltshallen [...] Og der var ikke engang slået en streg i sandet endnu på det tidspunkt, så det var det allerførste møde og der blev som sagt bygget og tegnet alle mulige forslag til hvordan og hvorledes gruppe 1, gruppe 2 og gruppe 3 kunne forestille sig, hvordan digerne se ud. Det var meget kunstnerisk og måske ikke så praktisk og der eksisterer nogle fede tegninger, hvordan det kunne se ud med naturtræsgangsti nede i sandet og i det hele taget sindssygt flot.

VD: Er der noget politisk opbakning i det I gør. Er politikere involveret i det her?

Interview 1: Ikke hvad jeg har hørt om. Vi har jo lige... har du hørt om Slagelse kommune [laughs]

Interview 1: Jeg tror, de her kampe i byrådet, de har fyldt for meget til at man interessere sig for, at der er noget der hedder dige og digelaget, så personligt er jeg sindssygt glad for Interview 2. Hun er yderst kompetent, hun ved hvad hun snakker o, og hun har styr på sin ting. Hun er en god hovedpude, det skal hun selvfølgelig ikke blive ved med at være, fordi vi skal stå på egne ben, og det er så det, vi skal have i næste uge.

VD: Så hvor langt er I kommet nu? Lad os sige, hvis der ikke kommer en klage, hvornår bliver digerne så en realitet?

Interview 1: Om 2 år. Så er det der.

VD: Det er da lang tid, når det [the big disastor] har sket siden 2006

Interview 1: Så skal du bare se, når vi snakker sammen. Vi kan være noget så sarkastiske. Vi driller også Interview 2 med det, men igen det er åbenbart den tid, det tager og så skal vi være

glade for at vi ikke har fået oversvømmelse andet end den der var i 2006, som ligesom er startskuddet til det hele. Så et eller andet sted skal vi bare være glade for det.

VD: I prøver at forebygge så meget, I kan, og hvis det sker, så vil I have at skaden blive minimeret som muligt?

Interview 1: Ja det er klart. Hvis det sker i morgen, så bliver vi taget med bukserne nede på knæene. Og så kan man begynde at råbe på politikerne har sovet bla bla. Og tro mig sådan en slåskamp vil komme men så måske, når alle er glade. Så lad os håbe, at det ikke sker og så vil der ikke komme nogle lad os sige pege fingre. For det øjeblik at der sker, så bliver der peget fingre. Og tro mig, hvis det skulle vise sig, at diget ikke var højt nok, og det løber over med en centimeter, så bliver der også råbt og skreget på kommunen og ingeniørfirmaerne. Sådan vil det altid være. Vi snakker noget så uberegneligt som naturen.

[tells story from his experience in Indonesia and tsunami. Lived in Jakarta at that time. He did not live in the affected area per say]

Interview 1: Jeg ved, hvor meget lort sådan en kop vand kan forårsage min garage inde i Indonesien regnede [...]. Jeg har set, hvor meget det kan ødelægge.

VD: Hvor villig er du så med til at leve med risikoen for oversvømmelse. Er det derfor du og de andre prøver så meget som mulig finde en løsning for at minimere risikoen?

Interview 1: Svaret er på den måde. Hvis der var et hus nede langs stranden jeg kunne tænkte mig... det her hus har vi fordi det måske er billigt, men drømmehus ligger inde på Skovvejen, der på ingen bliver oversvømmet, men det er så en anden historie. Hvis nu vi kunne flytte det hus og sætte den ned på stranden, ja så ville jeg gerne det. Så det vil være en kombineret af at det skal være lækkert. Det skal være det jeg vil have så ville jeg godt tage den chance. [...]. Jeg ville selvfølgelig også sikre mig alt det jeg kunne. Skulle jeg have mit drømmehus ned langs stranden, så vil jeg selvfølgelig sikre mig efter alle kunstens regler, og hvis jeg ikke gjorde, så tror jeg, jeg vil få den problem, der hedder, at forsikringen ikke vil dække dig, og det er en af de argumenter, vi bruger for dem som er lidt imod dernede, som synes at det ser surt at de mister deres udsyn, eller at de skal bære båden et par hundred meter end normalt. Du kan selv vælge, altså du kan også lade være.

VD: Tror du at grundejerne kan i fællesskabet ruste området for at modstå klimaforandringerne?

Interview 1: Vii har ikke rigtig nogle grundejerforeninger hernede. Det er lige netop, fordi det er på norsk eneboliger. Der er nogle mere eller mindre social samvær på nogle af vejene men ikke decideret foreninger. Jeg tror der er kun en, men pænt stykke derned ad. [...] ellers er det kæmpe mix af udlejningsejendomme, sommerhuse og parceller uden grundejerforeningerne

VD: Hvilket problemer er allerstørste som forhindrer både forvaltningsmæssigt og praktisk. Hvad tror du er den største udfordring for jer?

Interview 1: Jeg ser ikke nogen udfordringer, fordi det er lidt... hvis vi skal tage det lidt malerisk, så er det lidt med pistolen for tindingen. Der er ikke nogle valg, fordi der ikke nogen mennesker med bare to minutters sund fornuft inde i hovedet, der siger nej til det her. Også selvom du er imod det. Du kan nok være så meget imod det både af politiske og alle andre årsager. Det er moder natur, og hun bestemmer det. Det er fuldstændigt ligegyldigt, hvad du mener. Det er moder natur, der bestemmer det her. Og hvad kommer så efterfølgende? Det gør økonomien. Hvad kommer der så bagefter, det er mig som boligejer, og det er først længere nede, at der kan komme politik, hvis det endeligt er det. Så det er ikke et spørgsmål om at vælge eller kan love eller kan slippe uden om, eller er der en anden vej. Nej der er der sgu ikke, for hvis vandet kommer så kommer vandet og det kommer i øvrigt lige nede herfra.

VD: Hvis du kunne vælge, ville du så vælge digerne som den ultimative løsning, eller kan der være andre ting?

Interview 1: Hvis man skal droppe digerne... Det er jo faktisk et meget sjovt tankeeksperiment hvad så? Og lad natur gå sin gang kan man sige. Det ville kræve nogle helt andre tiltag, hvor det ikke bare lokalt men så bliver det globalt, og så er vi ude i CO₂ udslip og alle de der ting. Så skal vi tilbage til grøn levestil og vil vi det? Skal vi cykle til Thailand eller flyve til Thailand? Vi er skide magelige, når det kommer til stykket. Jeg bruger en dieselbil, hvorfor har jeg ikke en el-bil, fordi jeg skal charge det hver eneste dag, det koster altså noget CO₂ på en eller anden mærkelig måde. Så den der såkaldte grøn el-bil, den er nok så grøn alligevel. Hvis du kører i en nyere dieselbil, som jeg gør, så mit bidrag til at gøre verden mere polluted. Hvad skal jeg gøre for at undgå det? Taget toget? Hmm det er skide ustabil. Vi lever i en verden, hvor stabilitet er en ting, du er nødt til at være mødestabil, du er nødt til at være stabil i arbejdsindsats, altså vi skal producere hele tiden for at kunne bo her eller bo der eller et eller andet. Så hele det mindset skal fuldstændig retænkes, hvis vi skal droppe digerne. Hvis du kigger på en verdenskort taget ude fra rummet midt om natten, hvor man kan se, at der er lys, hvor er der så mest lys henne? Kysterne. Mennesker bor ved kysterne. Tag New York, San Francisco. [tells that they are also at risk of high water rise]. Hvordan kan vi undgå det? Der er kun to måder. Lad være med at svine eller lave en dige. Jeg tror, vi laver digerne, fordi det er nemmere end at lade være med at svine. Vi snakker og røvet går, men gør det modsatte. Derfor så hedder det dige og ikke et alternativt, for alternativet det vil være så stort og så krævende, at det tror jeg ikke, at du finder en eneste politiker... Men vi skal helt derhen, hvor vi er ude og kigge på en af de her amerikanske katastrofefilm, hvor det hele ender om hvor præsident står og siger, det skal vi aldrig gøre igen. Og vi skal derhen. Ellers så sker der ikke noget. Da vi har en viden og en teknik der gør, at vi bygge os ud af det, så det vi gør. Praktisk og nemt versus besværligt.

VD: Du tror at digerne kan godt være et langsigtet plan?

Interview 1: Digerne kan være udmærket. Jeg tror ikke på, at digerne er en statisk enhed. Det er en dynamisk enhed, som kan bygges op, og det vil være på et tidspunkt, fordi når polerne er smeltet så stiger vandstanden med 7 meter, så er det edderme noget lort. 40 centimeter over havets overflade, så har vi også våde tæer heroppe.

[tells him that good he is aware of the consequences]

Interview 1: Jeg tror egentlig, at folk er klar over det, hvis du bliver prikket lidt på skulderen. Men i jagten på egen lykke hvis man kan sige det sådan, hvad fanden er det? For nogle er det en speedbåd, for andre er det en Porsche måske noget helt andet, så så længe vi jagter på de ting, så stopper det ikke. Så længe at jeg som forældre accepterer, at min datter skal have et eller andet speciel mærke på sit tøj for at være sikker på, at vi går fri af skolemobning, så vil det forblive det sådan. [...] Så indtil den dag hvor det kommer, at vi er kun nødt til at tænke på dige og ikke det basale behov. Hvad skal der til for at komme dertil en kæmpestor katastrofe. Og jeg tror det sidste kommer først. Katastrofen kommer først før paradigmeskiftet [...] ikke før at halvdelen af Korsør stod under vand.

VD: Hvad håber du på, at Korsør kommer til at se ud om 5-10 år?

Interview 1: Korsør er en pendler by, og det bliver endnu værre endnu. Som jeg sagde lige før, vi mangler kun at lukke kirken. Der er jo ingen virksomheder tilbage [...] Der sker ikke noget i butikkerne, at de kan overleve. Det er mig ubegribeligt. Vi er tæt på vor herres røvhul, undskyld mit franske. Men her er dejligt, for ellers blev vi jo her ikke. Nu har vi boet her i 12 år.

Appendix II: The transcript of the project leaders Interview informants 2 and 3 April 2nd 2019

VD: Jeg har læst om, der var 5 udvalgte sårbare områder. Men på hjemmesiden fokuserer I på to af dem- Korsør centrum og Halsskov. Betyder det at i bare kigger på to af dem eller prøver i stadig at fokuserer på alle områder i Korsør?

INTERVIEW 3: Altså der er stadig fem prioriteretsområder. Vi er bare kun i gang med de fire af dem, fordi vi ikke kunne have kræfter til at løfte det hele endnu ikke.

INTERVIEW 2: Også så har vi vel valgt Halsskov, fordi der var nogle grundejere, der har oplevet en oversvømmelse i 1993, så der er var nogle grundejere som gerne ville... Altså jeg ved godt, at vi også havde fokus på Korsør bymidte...

INTERVIEW 3: Jeg tror, at den officielle forklaring er i virkeligheden at bare for at indhente nogen erfaring, før vi gik i gang med Korsør bymidte, som skulle være lidt mere kompliceret. Det jeg ved ikke, om det er, men altså.

VD: Så Halsskov startede sådan allerede i 1990'erne, at man begyndte at tænke på kystbeskyttelse?

INTERVIEW 2: Det tror jeg ikke, at man gjorde, fordi man ikke havde oplevet det sådan så ofte. Jo, der har været gammelt dige på det område fra 1800 og et eller andet. Så der har været en oversvømmelse af området. Det ligger ret lavt.

INTERVIEW 3: Jeg tror især den store oversvømmelse, vi havde i 2006, der satte skub en del.

VD: Jeg fornemmer, at Korsør midtby var den nyere område, altså når man kigger på opdateringer fra kommunens hjemmeside

INTERVIEW 3: Ja, det er det også.

VD: Okay, jeg vil gerne spørge om noget indholdsmæssigt. Hvilke strategier, instrumenter kan man sige, I bruger til for at minimere flodrisiko. Hvad for nogle tekniske foranstaltninger er der benyttet i både Korsør midtby og Halsskov lige for tiden?

INTERVIEW 2: Altså på Halsskov så er det diger... jorddiger og nogle spunsvægge, som vi bruger. Og så er der hævnning af en vej, også er der en erosionsbeskyttelse med sten og lidt revstruktur. Det er sådan set...

INTERVIEW 3: Og så satte lidt fodringer også ikke?

INTERVIEW 2: Ja sandfodring, og kompensationsfodringer også. Det er de tekniske på Halsskov.

VD: Ja, i har vel ikke overvejet en kæmpe stor...

INTERVIEW 2: En-løsning?

INTERVIEW 3: Altså nej, der har jo overvejet en sluseløsning i sin tid ikke, men det ville jo være enormt dyrt, hvis man skulle gå ud og have fanget sådan så alle hele området bliver beskyttet, og det kunne simpelthen ikke lade sig gøre.

INTERVIEW 2: Nej det kan det ikke lade sig gøre. Så skal vi også have en slusning også ved Skagen. Men det er fordi, noget af vandet kommer jo fra Storebælt og altså Korsør by kunne man jo altså bymidten, ville man godt kunne lave en sikring med en sluse. Men så har vi jo stadigvæk hele den nordlige del, der ikke bliver sikret.

INTERVIEW 2: Men hvis vi laver en sluseløsning her [draws on the white board], så kan vi godt sikre en del af byen her, men vandet kommer jo stadig ind her. Så vi kan ikke sikre de her arealer på den nordlige del, som du var inde og se på - på en sluseløsning.

INTERVIEW 3: Korsør bymidte er en kombination af højvandsmur og grønt dige formentlig.

VD: Og ikke noget med forhøjet vandkanter?

INTERVIEW 3: Kajkant? Nej. altså det står beskrevet sådan, men det er det ikke, altså det bliver en mur, der bliver trukket væk fra kajkanten.

VD: Og er det også ret dyrt at gøre det?

INTERVIEW 3: Ikke i forhold til at lave sluse for eksempel, så er det en relativt billig løsning, men mur er stadigvæk dyrere at etablere i forhold til grønt dige, men inde i bymidte er der ikke så meget plads, og det ville også have været set meget mærkeligt ud med et grønt dige igennem den centrale del af byen, kan man sige og havneområdet. Her vil der falde mest naturligt at det er en mur.

INTERVIEW 2: Ja, men der kommer også et grønt dige på den længere henne ikke men, der falder der bedre ind.

[...]

VD: Der er et sted i Sverige, hvor man prøver at lave en kæmpe stor mur omkring, men det ville ikke være så godt, fordi der er mange folk, der netop bor tæt på kysten pga. udsigten. Det ville nok også gå ud over kommunens værdi altså for at sælge huse for eksempel. Men er der en

måde, hvor i tænker at i afskrækker eller sige til folk, at de her sårbare områder, der skal i passe på med at bygge for de kan være tilbøjelige for flodoversvømmelse. Hvad gør i med det?

INTERVIEW 2: Egentlig så står jo i vores kommuneplan at man skal bare tage højde for det, så der sådan ikke: her bygger vi ikke. Altså der er faktisk politisk vilje til...

INTERVIEW 3: Men i lokalplanerne skal der tages højde for det, ikke?

INTERVIEW 2: Ja, så det vil sige at hvis man laver en byudvikling, så skal man se, hvordan sikrer vi det nye byområde mod en hundredårshændelse.

VD: Okay, så de folk der gerne vil bygge nye huse, skal de sådan set spørge om tilladelse fra enten jer eller?

INTERVIEW 2: Ja, det kunne godt være, hvis vi laver en højvandsikring eller en erosionsbeskyttelse, før det bygger.

VD: Og det er ikke noget med at i relokere, flytte nogle bygninger fra det ene sted til det andet, det gør i ikke?

INTERVIEW 2: Det er ikke så slemt endnu men sådan på længere sigt, ville det jo være altså være en langsigtet plan over det næste 100 år, ville det jo være give en rigtig god mening at sige, det her område udvikler vi ikke på, vi lægger det længere inde i land, men det er svært at omvende fordi havet tiltrækker jo..

INTERVIEW 3: Og så er der så mange investeringer i området. Så lad os sige bymidten her, der er infrastruktur, der er ledninger, der er altså alt mulig...

Interview 2: Skoler, biblioteker, og det hele. Det er ikke bare sådan at flytte små huse.

VD: Okay. Jeg ved ikke om det var noget, man tænkte på før den store storm i 2006, men har man pga. den storm, og selvfølgelig storm efterfølgende fx i oktober 2017, der vidst hed Alfrida, der også var slem. Men har i nu så et evakueringskema eller beredskab til beboerne. Hvad skal de gøre, hvis der nu kommer advarsler om potentiel stormflod? Har i det?

INTERVIEW 2: Altså jeg ved, at vi har en plan for, hvis der ikke skal evakueres, så har vi nogle steder, hvor vi sætter midlertidige diger ud eller spærringer. I decideret evakueringsplan, jeg er ret sikker på, at vi har det.

INTERVIEW 3: Man altså man kan sige hele den her beredskabsting, det hører jo til beredskabet, og det er dem, der styrer alt det. Det er vi slet ikke på den måde, vi er involveret i. Den måde, vi har involveret, det er har været at have kontakten til de etableret digegrupper, så en beredskabssituation har vi ligesom kunne holde dem informeret om, hvad er prognosen, hvad gør beredskabet, hvad gør de ikke, hvad forventer vi. Altså vi har bare haft sådan en

formidlingsrolle her i kommunen ikke. Mens alt det med evakuering, det hører til ude i beredskabet. Det vil altid være dem der beslutter og styre det.

VD: Det er sådan set dem, der skal formidle det til beboerne...

INTERVIEW 3: Dybest set så har vi bare været altså kontakts.. for at aflastet dem kan man sige, så de kunne koncentrere sig om højvandet og det de nu skal lave, så har vi fungeret som ja talerør ud til de etableret digegrupper med kontaktpersoner.

VD: Jeg læste, at Slagelse kommune var den der modtog flest penge fra Kystdirektoratet, da der var den værste storm?

INTERVIEW 2: Vi fik den største, ja, stormflodsskader her. Der var flest antal af skader her.

INTERVIEW 3: Også er der erstatning fra stormrådet, ikke, i virkeligheden.

VD: Ifølge kystbeskyttelsesloven, så er det stadig grundejernes ansvar, at de skal kystsikre deres eget hus. Men hvad så hvis de skal have brug for at optage lån, er det noget man kan søge i en pulje hos jer eller er det noget med, i så skal låne penge fra, eller hvordan går det med det?

INTERVIEW 2: Der er flere måder man kan gøre det, men hvis du som enkel grundejer ønsker at lave en erosionsbeskyttelse, så tror jeg man kan søge.

INTERVIEW 3: Det må man selv rode med, men altså man kan sige at de her store fællesprojekter, der kan man optage sådan en kommunalgaranteret lån, og hvor kommunen er dem, der inddriver via ejendomsskatterne pengene. Så i de her sager, har kommunen en rolle.

INTERVIEW 2: Vi låner op til 25 år kan man låne og afdrage.

VD: Hvis man skulle lave en dige, så var det 2000 kr. per m² det koster?

INTERVIEW 2: Det ved jeg faktisk ikke, men det passer meget godt.

VD: Betyder det så digegrupperne i Halsskov selv skal betale det lad os sige 150.000 kr for digerne?

INTERVIEW 2: Ja.

VD: Uden at få økonomisk støtte fra jer?

INTERVIEW 2: Nej altså på Halsskoven er det sådan, at de her store fællesprojekter, hvor kommunen godt kan give dem et kommunegaranteret lån, så afdrager de over 25 år. Og hver grundejer, altså i et område er det 3-6.000 kr man skal betale og i et andet område er det 8.000 kr, og hvis det er sådan nogle beløb der er fordelt over 25 år, så er det jo ikke ret meget, vi skal

betale. Og så er der et område, som skal betale 19.000 kr, så det er stadigvæk sådan nogle overkommelige beløb.

VD: Det der med digegrupper, jeg har bemærket, at det findes i Halsskov men Korsør midtby, hvad gør i med det?

INTERVIEW 3: Der er ikke digegruppe, men der har vi foreløbig haft dialogen lidt anderledes men sådan nogle lokalråd, erhvervsforening, fiskerihavn, lystbådehavnene, der har vi sammensat en anden type gruppe. Der er ikke nedsat en decideret digegruppe, som der er på Halsskov, fordi bymidten er lidt noget anderledes, lidt mere kompleks sammensat. Altså på Halsskoven, er det meget alm. boliger, ret homogene områder, hvor i bymidten, der er noget mere erhverv, detailhandlen osv. Så der har vi involveret de her interessenter i stedet for at nedsætte en gruppe af beboer.

VD: Altså det med digegrupper, er det deres eget initiativ, der har lavet den her gruppe eller var det noget i foreslog eller var med til at give nogle værktøjer til, eller hvis de gerne vil havde lavet noget fra NIRAS med en rapport.

INTERVIEW 2: Det gør vi ikke. Men altså på det tidspunkt, man har haft et ønske om at inddrage borgerne meget i de her projekter, hvor de selv skal betale og hvor alle kommer til at ligge så tæt på deres område. Så der har vi har bare nedsat nogle grupper der har været frivilligt, om man vil være med eller ej. Og der 7-12 medlemmer i grupperne. Og dem har vi har rådspurgt i forbindelse med bidragsfordelingen og lidt om linjeføringer og udformningen, men det er ikke bestemt hvilken rådgiver. Det er noget kommunen har besluttet at køre den proces og har lavet aftale med rådgiveren. Så den udstrækning vi synes, der havde givet mening, der har vi brugt dem.

[I asked about the stakeholders in the inner city, where Interview 3 responded].

VD: Hvor ofte er du i kontakt med dem?

INTERVIEW 3: Jamen, nu har projektet ligget stille i hele 2018, og nu skal vi starte det op igen. Og ja, de vil blive involveret igen, men lige nu er der noget andet arbejde, der forelægger altså noget fundssarbejdet og sådan noget, som vi skal igangsæt. Så nu er der i virkelighed nogle andre interessenter, vi skal have fat i vores forsyningen, vores entreprenørservice og beredskabet osv. vi skal have planafdelingen osv. Vi skal have i dialog nu på nuværende tidspunkt.

VD: Gør i opmærksom på folk, at Korsør ligger meget lavt, altså er der nogle kampagner eller andet i den stil.?

INTERVIEW 2: Nej, det tror jeg ikke. Altså man har vidst det i mange år. Man har været ud til havet, man har oplevet de her oversvømmelser. Ja dem vi havde snakket om her nu ikke. Men der har ikke været behov for sådan større kampagne. Vi lægger noget ud på hjemmesiden, når der er i højvandssituationer, beredskabet fortæller og skriver lidt om, hvad man kan gøre.

INTERVIEW 3: Altså man kan sige, at nu er vi blevet en myndighed, så nu overvejer vi at lave en kampagne for at oplyse borgerne om, at de nu skal huske at søge om at få tilladelse til at kystbeskytte deres ejendom, så de ikke bare får lavet et eller andet ude på vores strande. Sådan en kampagne har vi tænkt os at lave, men jeg tror de fleste, der bor her i byen ved godt, at de bor i udsat, og lavtliggende område og oplever mange gange, at det har været tæt på.

VD: Hvad har været de største ændringer i forhold til strategi siden 2006? Var der noget på det tidspunkt, hvor man ikke før har taget højde for eller noget, man ikke vidste?

INTERVIEW 2: Man vidste godt. Altså Korsør og Halsskov, måske Korsør bydel det kan jeg ikke helt genkende, der ville man jo lave en højvandssikringer, man ville jo også lave det i Skælskør. Også blev vi udpeget i risikostyringsplanen eller hvad hedder det,,

INTERVIEW 3: Ja det hedder... udpeget risikoområde i oversvømmelsesdirektivet.

INTERVIEW 2: Så det er den forskel, og det var en gang i 2010 eller 2011, man gjorde det.

INTERVIEW 3: Ja, det kan jeg ikke helt huske præcist.

INTERVIEW 2: Ja, så vi har haft et oversvømmelse, og så blev vi så udpeget på landsplanen som en af de byer, hvor der er størst værdier på spil, også har vi lidt mere fokus på Korsør, ikke.

INTERVIEW 3: Ja og så vil jeg sige, at de klimaforandringer tror jeg spiller mere og mere ind, ikke? Får vi nu lagt en ordentlig tillæg og svarer det til det der reelt sker. Det synes jeg er noget, der rumsterer mest lige nu det er den sikring vi planlægger, er det egentlig overhovedet godt nok [laughing]

VD: Hvad sker der hvis nu man laver diger og bliver overrasket hvor højt...

INTERVIEW 3: Hvor hurtigt det går med havvandsstigninger, og kan man bygge videre på det og sådan noget [gets interrupted]

VD: Nu hvor i siger, at i snart ville genstarte arbejdet, men har i måske tænkt jer at starte med nogle innovative eller endda radikale ideer, at man måske kan prøve noget nyt, eller er man blevet holdt tilbage, fordi man er også begrænset af, hvor meget man kan gøre, om i kan få tilladelse fra kystdirektoratet...'

INTERVIEW 3: Nej, vi skal faktisk selv give tilladelse til det nu, men stadigvæk det skal være løsninger, som vi skal være sikker på holder i situationen. Så jo det kunne være spændende at gå ind i noget innovativt arbejde og prøve noget nyt af, men vi skal også være ret sikre på, at når situationen er der, vi står i en højvandssituation, at det også holder vandet ude. Så, det er sådan en balancegang, og plus det er...

INTERVIEW 2: Det er grundejerne, der betaler for det her. Vi skal ikke til at eksperimentere med nogle nye, spændende løsninger.

INTERVIEW 3: Netop fordi vi har så mange områder udsatte, og det er grundejerne der skal være med til at finansiere det, så det er også begrænset hvor meget vi kan... det må heller ikke koste for meget, vi skal vælge den billigste, bedste løsning-agtig ikke.

INTERVIEW 2: Også hvis man begynder med at eksperimentere, så tager det tid og som du selv snakker om i starten, vi har jo ikke i gang med alle områderne, og det er sådan resourcespørgsmål.

INTERVIEW 3: Men når det er sagt, så prøver vi nu og komme med i Realdania-satsning, der hedder byerne og det stigende havvand. Der kan man nu søge om at være med til at, altså spille områderne ind, så de kan være med til at udvikle, og det håber vi på, at Korsør bymidte bliver et af det udpegede områder, hvor man kan gøre det til et pilotprojekt. Så det kan godt være, at der sker noget nyt og spændende på et eller andet måde der.

INTERVIEW 2: Det er så Realdania, der vil betale for den proces, så den pålægger vi ikke kommunen eller grundejerne.

VD: Hvis man benytter digerne som fremgangsmåden, som det mest primære ting, kunne man forestille sig at man ser vand som trussel, altså man vil distancere fra det i stedet for at integrere det til Korsør og ligesom gøre vandet som en del af deres identitet. Har i måske overvejet at ændre jeres synspunkt?

INTERVIEW 2: Altså vi har været der for nogle år siden, hvor man snakkede om nordens Venedig, og det skulle være Korsør, og vandet skulle inde i byen. Men vi gik lidt væk fra det, fordi det var sådan nogle, hvad kan man sige, store tanker, og det er en havneby. Altså der er jo vand rundt omkring byen, så det med at tage vandet ind i byen og lave nogle andre løsninger, det gav ikke rigtig mening sådan i den store sammenhæng. Vi har også lavet Solens plads og regnvandsbassin, men det bedste er simpelthen bare vandet ud i havet med det samme. Vi har 120 km kyst, så det er ikke her, vi måske skal lege med de tanker, men inde i Slagelse by, som ligger langt fra kysten, er det nok mere interessant at ligesom lege med vandet og gøre det til en del af bymiljøet.

VD: Er det fordi, der er simpelthen for meget på spil altså rent økonomisk eller ...

INTERVIEW 2: Ja, jeg tænker, det er lidt det samme ting. I Korsør det er sådan er jo oprindeligt fire øer, og så kunne man sejle mellem øerne, også indimellem øerne, er det fyldt op. Altså det er kors-øer. Også har man fyldt det op for at skabe en ø. Og så snakkede man lidt om med at måske fjerne opfyldningen igen og så lave vand inde i byen -lidt ligesom Venedig-agtigt. Men det er altså rigtig dyrt at føre det tilbage, og er bare så meget vand lige udenfor. Så det er den opvejning af så meget ekstra får man heller ikke for pengene vej, og på anden side ligger nord jo. Det er ikke kun til den ene side, der ligger jo også vand der.

INTERVIEW 3: Korsør er jo omgivet af vand. Altså vi har vand alle vegne.

INTERVIEW 2: Og så er der også nogle små vandhuller rundt omkring. Så vi er ikke sådan bange for vandet, så tanken om at gøre vandet synligt og altså grønne og blå bånd, snakkede vi også om i kommuneplanen er slet ikke fremmed for os. Men der er også nogen gange...

INTERVIEW 3: Man skal også kunne holde vandet ude.

INTERVIEW 2: Og vandet skal være nogen steder i et sikkert sted, hvor det ikke give nogen skade.

VD: Jeg fik at vide, at der vil være i fremtiden vandsportscenter eller strandpark på Halskov. Er det en af de ting, man tænker, hvor man gør vand som en slags fordel og gøre det mere attraktivt?

INTERVIEW 2: Det er i fuld gang.

INTERVIEW 3: Ja, vi er meget bevidste om, at vi har en meget lang og smuk kyststrækning, og vandet er kæmpe attraktivt, og os der bor her virkelig nyder det til dagligt.

INTERVIEW 2: Så vandsportscentret er vi godt i gang med den med strandpark, som du snakkede om, det har også været et projekt, men det er skrinlagt. Og det var kommunen ikke interesseret i at gå ind i, men det var så en Realdania projekt også til 120 millioner. Men lidt som ala- Amagerstrandpark. Det var egentlig det, inspirationen kom fra.

VD: Os, som kommer udefra, har det svært at se ansvarsfordelingen mellem aktørerne. Så i faciliterer, hjælper beboerne til at tage en del af beslutningen, komme med nogle ekspertviden, hyre folk udefra som kan hjælpe med til hvordan fremtiden i området se ud?

Both: Ja

VD: Hvem er det i har kontakt?

INTERVIEW 3: Jamen vi har mange forskellige rådgivere på, men det har primært været Rosbæk, COWI, Niras, Rambøll.

INTERVIEW 2: Og så bruger vi også arkitekter jo på nogle af der i bymidten.

INTERVIEW 3: Altså hvordan man kan lave det her på en arkitektonisk, smuk måde, der passer ind i byen.

VD: Har det blevet gennemført?

INTERVIEW 3: Vi har fået lavet et visionsprospekt, som nogle af arkitekterne har lavet netop på baggrund af workshop med interessenter, som jeg har snakket om, så der bliver lavet noget

arbejde af nogle arkitekter. Men det er jo prospekt så det er jo bare nogle eksempler på, hvordan man kunne højvands sikre byen, hvor man tager højde for en række ting, og hvor man prøver at passe det ind i det eksisterende bymiljø.

VD: Hvordan er forholdet så mellem kommunen, beboerne og de eksterne interessenter? Det kan være svært at have en balance, og nogle ville ønske sådan skulle det foregå, men så ikke har økonomiske ressourcer til det?

INTERVIEW 2: Det er også det, vi har mest fokus på. Det er simpelthen økonomien i projekterne, hvor skal diget ligge, og hvor højt skal det være. Det er faktisk altid det, vi kører lidt rund omkring det, og hvem er det nyder gavn af det.

INTERVIEW 3: Og hvad man kan få tilladelse til det. Hvad kan man inden for lovens rammer? Og med de hensyn man også skal varetage. Der er jo det dilemma, man helst ikke vil tage sin udsigt væk, man ikke vil have et dige på deres grund og det ene af det andet, altså der er mange ting, der spiller ind.

INTERVIEW 2: Det er det, vi snakker rigtig meget om. Det er det, vi bruger rigtig meget tid på at få belyst sådan, så vi ved, hvor meget kommer det til at koste, hvor kommer diget til at ligge, hvordan kommer det til at se ud og sådan noget.

VD: Indenfor forvaltningsmæssige rammer?

INTERVIEW 2: Ja.

VD: Det vil sige, at det er meget svært at kunne tænke sig ud af boksen og komme med nogle meget radikale løsninger eller hvad. Altså det bliver meget traditionelt kan man sige. Noget man typisk gør.

INTERVIEW 3: Ja det gør det. Men det er fordi, vi mangler at se de utraditionelle løsninger, som virker og kan...

INTERVIEW 2: Ja det er tit, undskyld mig, hvis du virkelig kigger godt efter i boksen, så er det måske også der, hvor guldet ligger og ikke uden for boksen. Men det er bare nogen gange, at man tror, man skal helt væk fra det traditionelle for at finde en god løsning, men der er altså bare ret tit, at de gode løsninger ligger inden for rammen. Og hvis vi skal udvikle noget nyt, så kunne vi det, men der er ikke nogen der sådan... de vil bare gerne vil have en løsning. Og de vil bare gerne sikres, fordi de sover dårligt om natten hver gang, der er en stormflod, og så vil de bare gerne have en hurtig løsning. Men jeg synes faktisk, at vi kommer ret noget, som er rigtig godt og solidt.

INTERVIEW 3: Det man skal huske på, er, at de der alternative løsninger, det kræver ofte ret meget mandskab i situationen. Altså så er der sådan noget, der er sænket ned i jorden eller noget, man skal gøre et eller andet ved, når der så bliver højvande, og så hvem er det lige der skal gøre

det der ting altså lukke alle hullerne og hæve og få det op i jorden, hvad man ellers kan forestille sig, der skal trylles frem, når der er en højvandssituation.

INTERVIEW 2: Men vi følger altid med, hvis der sker nogle nye tiltag på forskellige områder, og det der vi skal sikre, det er at det er en teknisk god løsning. Det kan godt se nok så smart ud, men det skal bare virke den dag.

INTERVIEW 3: Altså vi har også en forventning fra vores rådgivere i virkeligheden er dem...

INTERVIEW 2: Der finder ud af de her alternative løsninger, så det her kan lade sig gøre her.

INTERVIEW 3: Vi er jo også en myndighed, det er også os, der træffer afgørelser om ja..

INTERVIEW 2: Ja og vi skal skulle stå til ansvar for det, vi tillader os til det.

INTERVIEW 3: Det også os til sidst der beslutter, hvordan det bliver.

VD: Hvordan er politisk opbakning her? Hvad synes politikere om det her? Om de støtter nogle af de ting, i gør?

INTERVIEW 2: Altså vi lægger tit vores projekter op politiske eller de får statusnotater på, hvor lang det er, så der er meget politisk bevågenhed, også fordi der er så mange grundejere, så mange vælgere der bliver berørt af de her projekter.

INTERVIEW 3: Ja der er stor politisk opmærksomhed på det her og også opbakning helt sikkert, det synes jeg.

VD: Er der mange diskussioner om, hvordan penge bliver brugt til og til hvilken grad kan ekstra omkostninger blive legitimeret?

INTERVIEW 2: Nej, det bliver svært, men altså det budget vores rådgivere lægger for os, og de lægger ekstra beløber oveni i forhold til den usikkerhed der kan være i sådan et projekt. Så jeg har en forhåbning, at det her passer bare og bliver måske lidt billigere.

INTERVIEW 3: Vi ved jo ikke, hvor meget det kommer til at koste, før vi bygger det. Der kan løbe ind i alt mulig, når man går i gang med at grave i jorden og skal lave noget. Så selvom vi prøver at tage højde for alting.

INTERVIEW 2: Og så løber vi også ind i, at når de laver budgetter, så er det fx for 2016, og så sender vi det i høring, og så går der lige 2-3 år mere, og skal man til at finde nogle helt andre priser.

VD: Hvordan tror i, Korsør vil se ud om 5 år?

INTERVIEW 2: Jeg tror sikkert, om et par år, så er der tre diger ude på Halsskov og vandsportscentret er udviklet og Korsør...

INTERVIEW 3: Er stille og roligt i udviklingen. Og vi kæmper for at forsikre byen. Og så går der en anden runde i gang med at hæve digen.

INTERVIEW 2: Ja helt præcis. Der vil være noget digelag og nogle justeringer. Der vil være rigtig meget arbejde i det.

[VD mentions that Korsør is not like Køge (coast city in Zealand) with straight coastline coming from one side].

INTERVIEW 3: Men det har vi jo egentlig altid set som en fordel, at vi har kunne inddele de fem områder, som ikke var hydraulisk forbundne, og derfor kunne vi sikre hver for sig. Fordel at kunne dele op i mindre bidder frem for store Køge-løsning, som strækker sig over mange kilometer, så det her er mere håndterbart og overskueligt.

INTERVIEW 2: Til sammenligning, så er storebæltsforbindelsen sikrer deres tunnelsystem og betalingsanlægget til 10.000 års-hændelsen. Så de går lidt højere op.