Lund University One-Year Master

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Swedish Application of Floods Directive:

Bottom-Up or Top-Down?

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Abstract

The purpose of this thesis is to firstly evaluate how the EU´s FD is implemented and understood on a national level in Sweden. This is done to highlight the process and division of power, together with the national implementation strategies demarcation across different actors in Sweden. The theoretical underpinnings operationalize the work of Hedelin and Lindström by two types of behavior presented by the members states in regard to EU frameworks. The first segment focuses on the integration-participation-sustainability concept of member states in regard to the FD, and the second segment demarcates the decentralized approach under which some member state (Sweden respectively in this thesis) wield power. To translate these concepts to praxis, two qualitative analysis methods –document content analysis and interviews– are used. The results show that while Sweden being a sustainability champion on many environmental policies implementation, there is still disharmony among different level of the governance. The way forward lays in more effective support from national authorities for lower levels of power, and especially in focusing on regional cooperation.

Key words: Floods Directive; Sweden; Skåne; Decentralization; Integration and Participation; Sustainability; Hierarchy of Power

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List of Abbreviations

2030 Biodiversity – EU Biodiversity 2030 Strategy

EC – European Commission

EEA – European Economic Area

EU – The European Union

FD – Floods Directive

FRMP - Flood Risk Management Plans

IPCC – Intergovernmental Panel on Climate Change

UN – The United Nations

WFD – Water Framework Directive

1. Introduction

The sea-level rise is one of the major challenges identified in the recent Intergovernmental Panel on Climate Change report "Global Warming of 1.5°C" (IPCCa, 2019 and 2019; IPBES, 2019). Due to global warming and increased frequency of unpredictable weather events, the sea level is rising, having serious implications for economic damage, loss of land and displacement of communities. While living in proximity to the coast has always come with certain levels of flooding

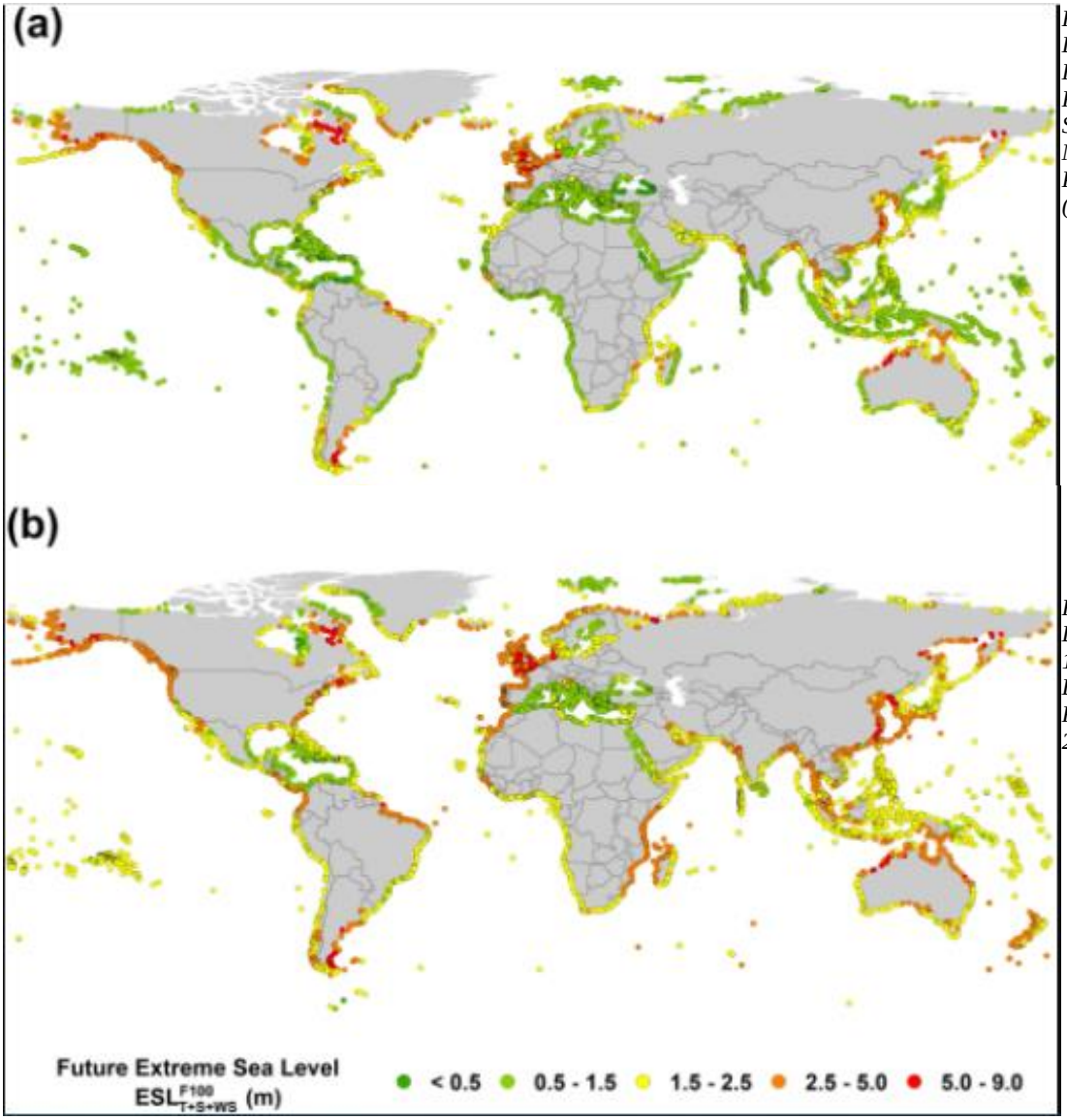

*Figure 1: **(a)** Global Distribution of the Historical 100-year Return Period Extreme Sea Level Based on Model Data for the Period 1979–2014 (ESRI, 2014).*

*Figure 2: **(b)** Global Distribution of Projected 100-year Return Period Extreme Sea Level for RCP8.5 in 2100 (ESRI, 2014).*

and erosion risk, climate change continues to alter coastlines; a new reality we must prepare to become accustomed to.

In addition to climate change, another great issue exacerbating the increased flooding, is the lack of awareness of how valuable the natural resources are in a natural resilience. In other words, global biodiversity is rapidly declining and ecosystem health deteriorating due to human activities (OECD, 2020). Without the negative human intervention, ecosystems were better equipped and more resilient in diverting the effects of flooding. Currently though, the threats from flooding, especially in coastal areas of the world, have been increasing for several reasons, all exacerbated by the economic growth worldwide. Firstly, more people live and work in coastal areas, increasing the absolute magnitude of properties and values at risk. Secondly, the coastal regions where the population is growing are highly dynamic in ways that increase flooding risks. And thirdly, sea levels have been rising for more than a century and the pace of sea level rise is increasing (Wong and Keller, 2017).

Therefore, countries with increased vulnerability (low-lying countries, island states, countries in extreme weather conditions location) have recognized the need to reduce their vulnerability to these increasing risks through adaptation, and strengthen their human and institutional capacities to assess, plan, and respond to these challenges (ADB, 2005).

1.1. The EU´s Flood Response and Sustainable Conduct

While many of these vulnerable countries have initiated their own national strategies, there are a number of joint international responses. Aside from the UN strategies, the EU has developed a systematic framework tied to the water sector. The main frameworks are a) Water Framework Directive (WFD), b) Floods Directive (FD), and c) EU Biodiversity 2030 Strategy (2030 Biodiversity).

Amongst other things, the purpose of the WFD introduced in 2000 is to prevent further deterioration, protect and enhance the status of aquatic ecosystems, and promote sustainable water use. The adoption and implementation of the WFD has had major impacts on European policies and management of coastal and inland surface waters.

Apart from the WFD, the introduction of the Floods Directive in 2007 aimed at tackling one of the major disaster events occurring throughout Europe: flooding. The FD has instilled a different way of thinking about flooding, looking to identify and adapt to risk rather than reacting to flooding after it has occurred, which is a clear benefit, mostly through river-basis structure and public participation. It has positively contributed to coordination and development of a framework for managing flood risks, raising public awareness about flooding and flood risk management and to sustainable climate change adaptation (STOWA, 2020).

The importance is on the word “sustainable”, which represents a promise that the concept of sustainable development shall be firmly rooted in risk management and flood decisions and operations. Bearing all the important studies, there are three main areas which a sustainable solution must have – consideration of the social impact on communities, identifying environmental protection, and adhering to climate adaptation

(Tiggeloven et al., 2019). The diagram below shows the FD planning cycle. The maps and plans are updated every six years. Despite progress in implementing the Directive and its success in prompting Member States to transition from a reactive to preventative approach to flood risk management, floods continue to cause major damage throughout the European continent (Fitness Check: Vermeulen, et al. 2019).

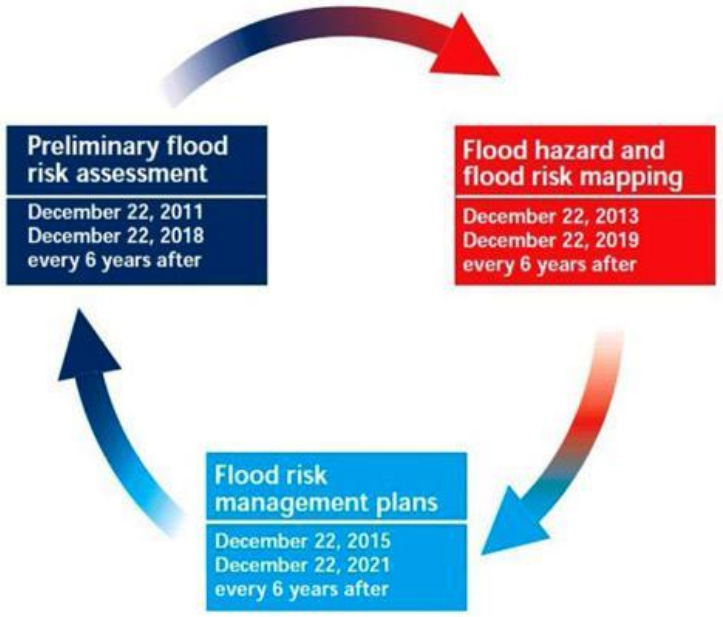

Figure 3: Flood Directives Cycles (STOWA, 2020).

The Fitness Check Evaluation of the Water Framework Directive and the Floods Directive (2019) has concluded that the implementation is satisfactory and progressing. The implementation of the FD has been found to support a shift from policies based on flood defense, to flood risk assessment and is a potential template for best practice disaster management. The reliance of Member States on EU financing mechanisms and the lack of other funding sources for the implementation of measures needed for the FD were noted. It was found that Member States are not evenly considering climate change as part of their implementation of the FD. Similarly, the use of Cost Benefit Analysis to inform the selection of measures in Flood Risk Management Plans (FRMPs) was found to be variable. Private insurance coverage to protect against flood damage is identified as low in the EU and is identified as a missed opportunity for the FD by some parties. Literature suggests that challenges in land use planning could be reducing the effectiveness of FD implementation in some

Member States. Furthermore, challenges remain regarding the incorporation of green infrastructure/nature-based solutions within FRMPs (ibid.).

Apart from WFD and FD, there are "green" directives which in some manner concern coastal flood protection and sustainable solutions. This is currently represented by the 2030 Biodiversity, aimed on increasing protected areas on land and sea, soaring of restoration plans, and support biodiversity loss-reversal strategies (EEA, 2020b).

1.2. Case Study Profile

As the focus of this thesis is to evaluate and understand in-depth[1] the FD implementation in Sweden, and Skåne respectively, few indices for this country must be discussed. Sweden is a low-lying country with its expected increase in water level by 1m by 2100. This is under the presumption of the climate change scenarios being calculated with an RCP which would be similar to current level of 8.5[2] (SMHI, 2021).

For most of Sweden's coastline, rising sea levels will be counteracted by land uplift which is occurring slowly following the weight of the ice sheet during the last ice age. In southern most part of Sweden, however, the land uplift has subsided and is close to zero. Slightly south of Skåne, it has been replaced by a landslide. In addition, Skåne is heavily exposed to beach erosion[3] as most of its coast is made up of loose sediments, which can easily be eroded by the waves (SGU[4], 2020).

[1] More on the aim of this research is under the sub-Chapter 1.3.

[2] RCP - A Representative Concentration Pathway is a greenhouse gas concentration (not emissions) trajectory adopted by the IPCC. The pathways describe different climate futures, all of which are considered possible depending on the volume of greenhouse gases emitted in the years to come by 2011. In RCP8.5. emissions continue to rise throughout the 21st century and create the greatest increase in temperature. However, with the adoption of new climate-oriented strategies, this pathway is very unlikely (IPCC, 2019).

[3] For this publication, the erosion of sandy beaches in Skåne is defined as a dynamic process depending on several variables. On sandy beaches with a significant amount of sediment and week established vegetation, the meeting between sea and land is changing. In these areas, sediment can be transported from the shore into the water and out of the coastal system to deeper seas, which creates erosion. On the other hand, sediment can be transported to the beach and accumulated there. The relationship between accumulation and erosion can vary over time.

[4] SGU represent Geological Survey of Sweden was founded by the SMHI in 2020 to run climate adaptation measures support in the coastal zones.

It is important to know which regulations are applicable when coastal flood protection project is being undertaken. According to Chapter 11 of the Environmental Code, the concept of water activity is defined as an area covered by water at highest foreseeable water level (Ministry of Environment, 2000). Here, it can be difficult to know what "highest predictable water levels" are. This is just one of many ambivalent information tied to the water, and flood conduct especially, which will be presented in this thesis about Swedish FD adoption.

Another of great challenges Sweden is facing is its extensive and diverse coastline, which makes it very difficult to create a one-size-fits-all framework for national policies to address specific locations in a sustainable manner. However, because of the bottom-up approach in Swedish flood protection area division, it is the responsibility of municipalities[5] to ensure that their infrastructure and urban areas construction, maintenance and evolution adheres to FD. Thus, the only logical and effective means to address this is to pave the way for intensive regional cooperation.

1.3. Aim and Research Questions

The purpose of this thesis is to firstly evaluate how the EU´s FD is implemented and understood on a national level in Sweden. This is done to highlight the process and division of power, together with the national implementation strategies demarcation across different actors in Sweden. Secondly, to better understand the complex, decentralized conduct, a more concrete county (Skåne), and municipality representants (from Ystad and Ängelholm) are chosen for all the criteria of bottom-up approach to be screened against. This is done especially because of the misleading explanation of the responsibility of tasks during an actual realization of flood protection project.

This is done in the hopes that the findings of the thesis, can contribute to the larger field of research, both within decentralization approach and, in different ways of how the

[5] As laid out by the national authorities. More details in Chapters 5 and 6.

FD is applied in a specific member state. Further still, I hope, to reach an understanding in regard to the differences and/or similarities in how the FD is understood on the different levels of the Swedish governance, but also how to find a joint approach for both local, and national bodies to cooperate. This is especially important as the impact of flooding, and natural disasters overall, affect not only one area, but a country as a whole.

To reach the aim of this thesis, two main research question are posed:

(1) What are the responsibilities of all of the levels of power with respect to the FD in Sweden?

(2) Where are the main obstacles between the successful implementation of the FD in Sweden?

1.4. Structure of the Thesis

This thesis is structured in the following manner: after this introductory Chapter, a discussion of the previous research on the FD´s implementation and the Swedish approach in flood risk management is laid out. This is followed by the theoretical base of this thesis; The approaches of Hedelin and Lindström are operationalized to delineate the positioning of Sweden within the concepts of integration, participation, sustainability, and decentralization. Furthermore, the methodology combining two qualitative analysis methods – document content analysis and interviews – is defined. Lastly, the analysis and the discussion of the findings in respect to the posed research questions is delivered in Chapters 5 and 6.

2. Literature Review

In this part of the thesis, the discussion about previous research on this particular topic is analysed. Both the EC political frameworks and Sweden were subject to extensive

academic research in the past. That cannot be said for the combination of sustainability-integration-participation-decentralization concepts which are likely to represent the conduct of flood management in Sweden. Indeed, there is not a great amount of literature focusing on the FD´s implementation, and especially in Sweden as a general concept. Rather, we see fragments of case studies from local places, or comparative literature on flood management of varying member states.

2.1. The FD Situation

As for the FD, its research is in the majority tied to its legislative notions (Eleftheriadou et al., 2015; EC, 2021), or its implementation by the member states (Priest et al., 2016; Trémolet et al. 2019). In addition, the varying instances of how member states include the implementation into their national plans vary (Nones, 2015; OECD, 2020). This is due to the nature of the FD; since its foundation, it has helped to instill a different way of thinking about flooding, looking to identify and adapt to risk rather than reacting to flooding after it has occurred (STOWA, 2020). However, because of the lack of articulate details about how such adaptations are to be held due to its only first finalized cycle, the comparison of effectivity of the FD among member states is hard to objectify (Vermeulen et al., 2019). Rather, there are a few reports on a transboundary flood basement management, mostly in continental Europe (EC SWD 30; 31; 33, 2019).

As for the overall implementation of the FD in Sweden, the preponderance of literature is from the national bodies, from a top-down perspective. These include reports from official Swedish bodies designed to deal with the FD in some part[6], such as the Swedish Civil Contingency Agency (MSB)[7], Swedish Geotechnical Institute (SGI), or the National Board of Housing, Building, and Planning (Boverket) (Näslund-Landenmark, 2017). Results in implementation were often discussed on EU-conferences where the

[6] The organizational of power among FD implementation in Sweden is further discussed in Chapters 5 and 6.
[7] The MSB is the primary authority in the Swedish realization of the FD.

national representation shared their insights and progress on the flood management under a STAR-FLOOD Framework Project. Here, the progress was discussed from the top-down approach, pointing out the advances which the authorities have done on behalf of Sweden (Hegger et al., 2014; STAR-FLOOD, 2014). Other important research on the Swedish national plan of the flood management was conducted by the SGI, focusing on planned retreat[8] and ethical adaptation towards rising sea levels, respectively (SGI 2018a; SGI 2018b).

2.2. Sustainability-Integration-Participation-Decentralization Nexus

As for the sustainable implementation of the FD – and important element stipulated in this framework – the Swedish Meteorological and Hydrological Institute (SMHI) has prepared a national sustainability adaptation plan[9]. Yet, it does not explicitly delineate the role such adaptation should play in flood protection structure and how this plan relates to the MSB´s realization of the FD. Sustainable development is also guiding the application of other relevant pieces of legislation, such as the Planning and Building Act/1:1/ (Planning and Building Act, 2018). That entails that adaptation to climate change in Sweden (for example in the form of considering flood risks) is an important factor to consider in the balancing of different interests when deciding on land use (Ek et al., 2015). This is especially apparent in location-specific cases which were analyzed both in foreign member state to compare with Sweden (Fiselier and Oosteberg, 2004; Newig et al., 2014; Fritsch, 2017), as well as in particular flood protection strategies in Sweden (Thorsteinsson and Larsson, 2012; Persson and Almström, 2016; Bontje et al., 2016 and 2018; Sørensen, 2020).

The integration aspect of the FD implementation in Sweden is often accentuated in previous research. On the national level, flood risk governance in Sweden is not

[8] Planned retreat, sometimes referred to as managed realignment is a flood solution focusing on moving the shoreline inland instead of using other coastal flood protection on already existing line (UNEP et al., 2016).
[9] Latest version is from 2015 – for more info see Andersson et al., 2015.

centralized from a policy perspective, with discussions relating to floods and flood risk are spread across several policy areas (Johannessen and Granit, 2014; Lindström, 2020). These areas include spatial planning, environmental protection, and emergency management (Ek et al., 2016). On the process of integration, again, the literature existing is usually in the form of a location-specific case studies across Sweden. Indeed, Lindgren (2019) provides an illustration from Ängelholm[10], Flemming (2020) studies integration processes in Helsingborg[11], Ystad[12] and Trelleborg[13], and Fredriksson et al. (2014) with Wang (2014) focus on Ystad as well. The flood management in Ystad is indeed one of the most studied cases in Sweden, as it has successfully implemented both physical, but also sustainable, nature-based-solutions (NBS)[14].

In the same line with other concepts, participation comprises highly complex mix of legislation, policy frameworks, and various actors which play a role in flood management of Sweden. This translates to the importance of coordination across different sectors, but also different policies. On the EU level, many argue that there is a greater need to increase the participation of elements between the WFD and the FD (Newig et al., 2014; Hedelin, 2015; Challies et al., 2016). This notion can be translated into the Swedish example; to realize a successful participation, the governance authorities connected with the FD must aim for greater cooperation and coordination (Wahl, 2013; Ohlsonn, 2014; Hedelin, 2015; Challies et al., 2016; Hedelin, 2017; STOWA, 2020).

The last segment in this nexus is the decentralization. While decentralization and integration might indicate the same concept, there are slight differences between these two (Ek et al., 2015). While integration indicates a cooperation, which can occur without any hierarchical order (Hedelin, 2015; Hedelin 2017; Bontje et al., 2018),

[10] Ängelholm is a coastal city in the North-West part of Skåne county.
[11] Helsingborg is a significant port-city in North-Western Skåne having an important ferry connection with Denmark.
[12] Ystad is an important tourist city in the southern part of Skåne adjacent to a UNESCO Alles Stenar site.
[13] Trelleborg, located in the Southwest of Skåne is a port city connecting Germany and Poland with ferries.
[14] NBS refer to the sustainable management and use of nature for tackling socio-environmental challenges, such as ecosystem-related approach.

decentralization is in this paper understood as a bottom-up decision-making process, where the individuals and local specialists gain a magnitude of rights and responsibilities (Fredriksson et al., 2014; Wang, 2015; Lindström, 2020).

To understand, and to be able to analyze these nuanced elements underlying the FD´s implementation in Sweden, the operationalization of nexus and hierarchy of power is conducted in the next Chapter.

3. Theoretical Framework

In this Chapter, the theoretical underpinnings of the thesis are presented. This thesis operates with two segments which are connected to the behavior represented by the members states in regard to EU frameworks. The first segment focuses on the integration-participation-sustainability concept of member[15] states in regard to the FD, and the second segment demarcates the decentralized approach under which some member state (Sweden respectively in this thesis) wield power. The combination of these two approaches will help me to understand the complexity and multi-leveled division of responsibility in Swedish adoption of the FD.

3.1. Integration-Participation-Sustainability

The first segment of theory is the integration-participation-sustainability strategy which is used to define the conduct of member states. This segment is based on the work of Hedelin (2015; 2017), in which she analyses the opportunities for integrated and participatory flood risk planning.

This theory presumes that for a successful application of the FD, *integrated* management approach is necessary for handling flood risk preparedness (Hedelin, 2015; 2017). In other words, integration refers here to something that can be obtained

[15] Member states is from this point onward referring to EU member states countries.

across disciplines, values, actors, and organizations (Jepson, 2001). In flood risk management particularly, such integration represents a wide array of vertical and horizontal cooperation across sectors and entities. Firstly, this cooperation can be done on a spatial level; with international, national, regional, and communal parties involved. Secondly, this cooperation can be understood as cross-sectoral, with different claims, sectors, and policy fields involved. For the EU water policies, integration is the cross-organizational notion of combining these water policies (e.g., while applying the FD, we should not forget to focus on nature, or water pollution stipulated in WFD, and Biodiversity 2030, respectively).

Second key element for increased effectivity of the FD is *participation*. Hedelin (2015; 2017) uses to explain her approach by merging Elander (2002) and Firus et al. (2011) together with her previous work. As a result, she defines participation as the active involvement of all invested parties, in which the increased involvement of civic society is the driving force. Such bottom-up approach gives greater voice to the people (e.g., when the member state adopts EU water framework, it can be changed in its legislative drafting stage based on comments from affected communities and individuals).

Lastly, the *sustainability* element in Hedelin´s theory rounds up the approach necessary for successful adoption of the FD. Here, she cites the preamble of the FD, where the overarching thought behind the FD is sustainable development. Then, she acknowledges the sustainable development as an important addition to integration and participation. However, she does not go deeper on the concept and on the different literations that ´sustainability´, or ´sustainable development´ carry. For the purpose of this thesis, however, the understanding of "sustainable" is concerning environment, communities, and climate change adaptation (as discussed in sub-Chapter 1.1.).

3.2. Bottoms ‘up Decentralization

The second segment of the theoretical underpinnings of this study is the concept of decentralization of power from EU to member states (sometimes also referred to as subnational division of power).

This segment operates under the research of Lindström (2020), who focuses on the subnational Sweden, the national state, and the role of the EU. On one hand, the decentralization with the subnational level shows how the civic society affects the realization of EU policies in Sweden. On the other hand, one can also observe how the EU policies are affecting everyday life, sometime also called “Europeanization”. This Europeanization is seen in four different areas: on the everyday activities of subnational governments, on regional development policies, on the style of policy-making, and on regional institutionalization (Lindström, 2020). However interesting, the four specific areas of Europeanization shall not be deeper explored in this thesis. Rather, the focus is on operationalization of the theories of these two authors to conduct fitting objective analysis of the FD´s application in Sweden.

While Hedelins´ and Lindströms´ theories might seem rather different, the fact is that the combination of these two segments must be used to understand the FD´ implementation in Sweden. Indeed, in Lindström work, the concept of decentralization includes the bottom-up activism, subnational capacity building, and top-down influence of the EU over conditions at the local and regional levels in Sweden. This focus on bottom-up activism and inclusion of various levels of entities is in the core of both Hedelin´s and Lindström´s theories. And, because of the wide array of issues that must be addressed in flood-prone zones, this cross-sectoral theoretical underpinning is crucial to address and successfully realize the FD. How that is being done in Sweden we shall find out in Chapters 5 and 6.

4. Methodology

This Chapter provides a methodological foundation under which was this thesis conducted. I have utilized different types of data collection methods, all within the qualitative research typology. This was done to understand the application not only by document analysis, but to fill in the grey areas with the addition of semi-structured interviews. First, a brief overview of the research type and used methods is laid out. Further, the details of the material and participants is presented. Lastly, a reflection on possible limitations is conducted.

4.1. Overview of the Applied Methods

The type of methodology used for this research was a qualitative analysis. Qualitative research relies on data obtained by the researcher from first-hand observations, interviews, questionnaires, focus groups, participant-observation, recordings made in natural settings, documents, and artifacts (Baškarada, 2014). Not only is this type of research reflective of the theoretical underpinning used in this thesis but it is also necessary to understand the EU framework. That said, as much of the language used in documents from the EC is carefully chosen legal narrative, the importance of the first-hand observation is essential to apply to these frameworks.

In detail, this qualitative conduct included two main types of data analysis method. Both of these types are tied to the chosen theories which support this thesis. The former is a content analysis which defines the study of documents and communication artifacts. These documents might be texts of various formats, pictures, audio, or video. Social scientists use content analysis to examine patterns in communication in a replicable and systematic manner (Graneheim and Lundman, 2004). This translates to ‘textual analysis’ used on wide array of content; from municipalities’ internal documents, EU records, academic publications, to specific project assessments. Both Hedelin (2015; 2017) and Lindström (2020) use in their research textual analysis to

understand the delineation of power in regard to FD implementation in Sweden. Hedelin (2015; 2017) conducts an extensive document analysis in order to synthesize fields such as integrated management, adaptive management, political economics, participatory planning, and multi-level governance. Lindström (2020) positions his work in an empirical analysis of subnational, national and EU policies, using reports and previous studies on this topic.

The latter method are semi-structured interviews that were conducted with a range of professionals who are involved in this field[16]. In these semi-structured interviews, my collection strategy was based on the work of Given (2008), where the researcher asks informants a series of predetermined but open-ended questions. The reason for this was for the interviewee to discuss their views, allow two-sided communication, and to help navigate in the flood management in Sweden. This was especially beneficial in applying the participatory and bottom-up theories because the views and the inputs from sub-national, bottom-up entities was crucial to understand the entire picture. Indeed, as the vast majority of the content in documents was drafted by the top-down power process, it was important to include the other side of the flood management. As for the interview part of my thesis, the idea of gaining grater insight is in line with Hedelin´s (2017) work, where in addition to textual analysis, she conducts interviews with local municipality level-entities in her case study of Karlstad[17].

4.2. Selection Process and Material

For this thesis, the process of selecting the case study of Sweden, was developed under the information-oriented selection. This selection process maximizes the utility of information from small samples and single cases. Cases are selected on the basis of expectations about their information content as random selection of a small number of

[16] The participant selection is further explained in sub-Chapter 4.2..

[17] Karlstad is city located in river- and lake-basins in Värmland county.

member states from a very large universe of potential states (Flyvbjerg, 2011). That said, there were certain guiding principles in the decision-making process for this case study. Firstly, already by the initial stages of drafting this research, it was decided for Sweden, and Skåne respectively to be the studied location. This means a member state must have been chosen first. Sweden was chosen because of the geographical proximity, personal and professional connection, and the option to get an access from local professionals. To better understand the decentralized system, I had to also gain insight from regional and municipal level. For this one-step-more-thorough comprehension, Skåne county was chosen with two municipal specialists on flood management. The reason behind choosing Skåne was because of the abundance of sandy beaches (in only two Swedish counties there is an important number of sandy beaches[18]) and because of the proximity to the writer.

In addition, many official documents published on national, regional, and local level in Sweden have been reviewed to anchor the research in the official political and legal framework. This translates to analysis of EU records, academic publications, and professional reports. As there is a great amount of literature, I had to prioritize which sources will be analyzed. Hence, as set of criteria was developed, which was used to present as objective and summarized sources as possible. The objective was to have at least two reliable literature[19] on the following:

1. Diversity in the impact of flood management from local to international sphere.
2. Diversity in geographical locations.
3. The participation-integration-sustainability approach.
4. Balanced mixture of different types of flood protection.
5. A variety of performing entities (public sector, professional, local, outcome of academic research) responsible for the research behind the flood management as

[18] Sandy beaches are often nourished as a part of flood protection and bring an interesting angle of the FD application.

[19] By reliable literature I am assuming peer-reviewed literature, reports from official international organizations, reputable news sources, and public documents.

well as a variety in the funding of respective solutions (public, private, public-private).

6. Different types of ‘audience’ being impacted on different scales (communities, industries, ecosystems, states) – to satisfy the decentralization theory.

As for the language used in this thesis, more than a half of the sources were in English, with a minority in Swedish (particularly in the analysis Chapter).

4.3. Interviews and Participant Selection

As indicated above, the reason to perform a set of interviews in addition to context analysis was to see the remarks and notions not only from the national, top-down narrative, but also to gather the bottom-up, decentralized views.

Hence, I have run 9 semi-formal interviews with a range of professionals who are involved in this field at national, regional, and local levels. These participants were identified through a review of academic publications, official websites, and supervisor recommendations. Due to the Covid-19 pandemic, interviews were conducted online after an email exchange. The analysis and interviews were conducted both in English and Swedish, based on the preference of the interviewee. While these interviews were conducted under the semi-structured approach, there was a set of topics which were discussed; (1) International and regional agreements and cooperation, (2) Local, regional, and national organizational structure, (3) Risk preparedness and disaster reduction in Sweden, (4) Legal/permit requirements, (5) Planning process/Funding, (6) Climate change and sustainability, (7) Accountability, (8) Challenges and opportunities, (9) Way forward.

INTERVIEWEE	POSITION AND ORGANIZATION	MEAN OF COMMUNICATION
Respondent 1	Academia, Lund Water, Water Management	online interview
Respondent 2	Academia, Lund Water, Coastal Floods	online interview
Respondent 3	Municipality, Ystad, Environmental Coordination and Coastal Geomorphology	telephone interview
Respondent 4	Municipality, Ängelholm, Environmental Coordination and Aquatic Biology	online interview
Respondent 5	National, SGI, National Coordinator Coastal Erosion	online interview
Respondent 6	National, MSB, National Coordinator Natural Disasters	online interview
Respondent 7	National, SMHI, Operation Manager	online interview
Respondent 8	Regional, Community Planning, Water Strategist	online meeting
Respondent 9	Regional, Community Planning, Climate Coordinator	online meeting

4.4. Discussion of Methodology

While the theoretical foundation and the literature review suggest the necessity for applying a methodology that would satisfy both top-down and bottom-up approach in the power division of the FD application, I am aware of certain subjectivity tied to this study.

Firstly, there are certain challenges in the material. That said, the exact sequence delineated above in the process of choosing sources was not the most important in this research, as many of the municipalities do not have the same amount of coverage as

the national bodies. Furthermore, the technical possibilities to have all the documentation related to the FD in Sweden in an online form was unfeasible. On that account, I was unable to reach all of the offline sources from the Swedish entities, either. In addition, because of the decentralized approach, much of the conduct is being done on smaller-scale level and decided on oral basis, which is sometimes harder to track.

Secondly, there can be certain setbacks in regard to the semi-structured interviews. In regard to the ethics of the interviewer, it is crucial to remain non-judgmental and focus on quality conversation and allow the interviewee to lead the interview (Adams, 2010). However, as the interviews were conducted in online form, and sometimes with technical disruptions, it was complicated to read voice tone, body language and the small nuances which in-person interview offers. In addition, there were more "blank moments" which interfered with the continuality of the conversation, and creation of deeper bond with the participant.

5. The Case Study

The following Chapter has been split into two parts: (1) the analysis of the organizational structure concerning the FD in Sweden, and (2) the policy framework discourse. These sub-Chapters were created to draw a line between those two topics, but also to bring more clarity in understanding its interconnectedness.

5.1. Organizational Structure Analysis

In previous Chapters, a variety of authorities and organizations were mentioned. This is because of the Swedish decentralized system of flood protection is not being governed only by one central power. This highly decentralized areas can be divided into three main layers: National level, Regional level, and Municipality level. Lastly,

individuals are given a greater importance and responsibility then in many other countries but are not usually counted within the most important entities.

Table 1: Non-Exhaustive Table of Organizational Structure in Swedish Flood Protection (Ek et al., 2015).

Level	Most important authority	Main responsibility in flood risk management	Tasks
National	Swedish Civil Contingencies Agency National Board for Housing, Building and Planning	Competent Authority for the Implementation of the Floods Directive	Responsible for flood mapping Educates public agencies and municipalities Provides information to the government. Provides (limited) funding.[3]
Regional	County Administrative Boards	Ensure that national goals are reached at the county level	Support and supervise municipalities in *e.g.* planning matters and emergency management
Local	Municipalities	Central operational responsibility for flood risk management	Spatial planning Emergency planning Water and sewage

- **National Level**
  - **Main Responsibilities:** Supervision Civil Protection Act; Supervision Environmental Act; Supervision Planning and Building Act

On the national level, flood risk governance in Sweden is not centralized from a policy perspective, with discussions relating to floods and flood risk being spread across several policy areas including spatial planning, environmental protection, and emergency management (Ek et al., 2016). No national adaptation plan exists, rather a series of environmental objectives which all partly touch upon the flood risk. That said, the coastal flood risk is scattered across different policy areas, with lesser areas of contact and information exchange.

In Sweden, the main body responsible for flood risk is MSB which implements the FD. In 2009, MSB was formed, with the objective of developing and supporting society's capacity to deal with contingencies and emergencies. MSB also has a small fund of approximately €2 million per year for "flood prevention". From this budget, municipalities may apply to fund/partly fund their flood protection projects, however, there are always more applications than there are funds available.[20] Its main objective on the national level is to support municipalities and County Administrative Boards by producing flood risk maps and assisting to facilitate implementation of local measures. From a meeting with Respondent 6, MSB´s most important and informative works include the General Stability Maps, complex General Flood Inundation Maps, Database on Natural Disasters for lessons learned, or Flood prognosis system, measuring water levels during a flood, to name a few. The MSB is sometimes criticized by municipalities, academia, counties, and other specialized national agencies for not engaging in a more systematic manner and on a greater scale by incorporating flood prevention in physical and building legislation and translating such into practice. Also, the criticism includes rather minimal inclusion of climate change into MSB operation and promotion of ecosystem-based adaptation projects. However, MSB argues that the results of its format of the FD implementation is curbed by the political sphere and the Swedish tradition in supporting bottom-up approach[21].

It has been claimed that "floods can vary in space and time very much; therefore, floods are tackled when they occur, by temporary dikes and evacuating people" (Fiselier and Oosterberg, 2004). "The fact that MSB has been given the primary responsibility for the implementation of the Floods Directive supports the perception that flood risks are primarily a matter of societal safety" (Ek et al., 2015).

There are other specialized agencies necessary for flood risk evaluation under the Swedish Ministry of Environment which are at the same level as the MSB (without the

[20] This issue of limited national funding was stressed by all Respondents.
[21] As mentioned by Respondent 6.

FD responsibility). Firstly, the SGI in charge of coordinating erosion-management as a part of climate adaptation. Secondly, SMHI is responsible for the metrological warning system and provides current estimates on river flows and scenario descriptions, which can be used locally to assess the risk of flooding. It also partially investigates climate change adaptation strategies (SMHI, 2019). Thirdly, the Swedish Environmental Agency (Naturvårdsverket) is responsible for the ecological standards, even in the flood prone areas. Lastly, Boverket is responsible for Swedish land plans and delineate the details in construction process of flood protection projects. However, apart from the MSB, none of these agencies has the legal power to oblige municipalities to adopt/follow their guidance,– they simply serve as specialized knowledge hubs for each sector. Also, to increase flood risk management effectiveness, it may be beneficial to aim for greater levels of organized interaction amongst these agencies.[22]

- **Regional Level**
  - **Main Responsibilities:** Supervision e.g., Civil Protection Act, or Environmental Act; Referral for Consideration for Land-use Planning

Since the decentralization of flood management in Sweden in 1980s, counties[23] are not the main players in the planning process, but rather act as a "consultant" (Ek et al., 2015). This is especially important in situations when the ability of municipalities to balance different interests is more complicated. In addition, the county – in our case Skåne, can work as a decision maker in green-lighting small scale flood protection projects bellow 3000m^2, instead of obtaining permits from the environmental court[24]. On the flip side, the long tradition of county-led government and often different stances from the county board and municipalities on what is the best flood solution still leads to setbacks in projects implementations. That can lead to the County Administrations

[22] A recommendation of the author.
[23] Swedish most common regional division is into counties.
[24] This information is based on the conversation with Respondent 2.

to requests adjustments of physical planning to be incorporated in the municipal plans, and to demand from the municipalities to implement the flood risk plans of the county.[25]

In the case of Skåne, the county administration is also responsible for some regional cooperation. Within Sweden, the county board together with other specialized national institutions, municipalities and with the support of academia, have developed the Regional Kustsamverkan Skåne-Halland (regional coast cooperation between counties Skåne and Halland) (Regional Kustsamverkak Skåne-Halland, 2021). This cooperation aims to increase the knowledge exchange, capacity building, and increase the "voice" from these regions to be heard at a national level and to be incorporated into political agenda.[26] The main issues in the area is the sea-level rise and increased erosion for these counties with greatest number of sandy beaches.

Outside Sweden, Skåne county board is the member in Interreg North Sea Region Building with Nature, European Regional Development Fund. Building with Nature supports the practical implementation of Nature Based Solutions, by a scientific evidence-base performance monitoring at 13 natural catchments and coastal laboratories. In Skåne, there are three projects under this initiative: Lomma eelgrass plantation, Ystad beach restorations, and river Råån natural enhancement (Building with Nature, 2021). Apart from the decreased burden in financing projects through such cooperation (OECD, 2016), the possibility to increase the connectivity of the decentralized system were goals that Respondents 4, 5, 8, and 9 all expressed.

- **Municipalities**
  - **Main Responsibilities**: Risk Management; Land-use Planning; Action Programs, Civil Protection Act

[25] There are a great variety of different plans from national, regional, municipal, and individual entities. All of these plans serve a different purpose, and often overlap. However, there is also many grey zones, and the author of this paper is looking into its further research in the future.
[26] Reported by the Respondent 8.

A key feature of the Swedish political system is municipal self-government, which is important in terms of governance and implementation of flood risk management strategies. The local level carries the main responsibility within emergency management and spatial planning as well as water and sewage. The local level is supported and supervised by national agencies at regional level the County Administrative Boards (STARFLOOD, 2014).

Municipalities finance their operations, emergency services, planning and building, and sewage, mostly through local taxes and charges. The local level receives some financial support from the central funding, mainly for investigative or defensive measures, crisis preparedness and recovery, but these funds are generally perceived as insufficient (MSB fund mentioned). Thus, as for distributional effects between the different levels of government, costs for flood risk management seem to be borne largely by those who enjoy its benefits considering the local nature of the risks. On the contrary, the presence of uniform insurance premiums implies that costs are borne by the collective irrespective of individual flood risk (Ek et al., 2015; Hedelin, 2015).

The municipalities, which are the key actors in flood risk adaptation, have only a consulting role in the implementation process, and have no actual legal obligation to perform the measures included in the flood risk management plans (Johannessen and Granit, 2014). But the problem is that they often do not have the necessary specialists, as there is no legal obligation and policy developed for each coastal municipality to have such experts. Hence, some municipalities with longer coastlines in Skåne have certain water specialists, while others do not. This issue comes to the fore particularly when flood projects need to be designed and installed and the county has no resident expert at hand. In these circumstances, a private consultant can be engaged, but this typically leads to delays in obtaining building permits. That is because as each of the preliminary plans are sent to the above-mentioned national specialized agencies who need to express their opinion before passing down to the environmental court, or county board for smaller-scale projects. But, as many of these projects require specialized

expertise, instead of consultancies, it is preferable to hire a specialized agency to conduct the assessment for the preliminary plan. However, as specialized national agencies charge double that of consultants, some municipalities budget for the project increases and threaten the successful completion of the project.[27]

- **Individuals**
  - **Main Responsibilities:** Own property and lives

The roles and responsibilities of the individual in flood risk management are complicated. While emergency and crisis management legislation build upon the principle that individuals have the primary responsibility to take and finance protective measures in relation to their property as well as to be prepared, this is not always acknowledged by the individuals themselves. Contracting appropriate insurance is also up to the individuals, which is quite established. This could however be because flood related damages are covered by basic home insurance policy, and not necessarily imply an active choice by the insured. Insurance companies are therefore also key actors at least within flood recovery (Ek et al., 2015).

To compliment the complexity of the Swedish coastal flood entities, when addressing sustainability, other Swedish laws must be assessed as well. For the environmental element, all projects in Sweden must reflect the Swedish Environmental Code of 1998. The overall aim of the Code is to promote sustainable development "which will assure a healthy and sound environment for present and future generations" (1:1) and the law shall be applied so that natural resources are used in a way that guarantees long-term sustainable development. Sustainable development is also guiding the application of other relevant pieces of legislation, such as the Planning and Building Act (1:1), which entails that adaptation to climate change (for example in the form of considering flood risks) is an important factor to consider in the balancing of different interests when

[27] Based on the communication with Respondent 5.

deciding on land use (Ek et al., 2015). However, one of the persistent criticisms[28] of the MSB is their promotion of grey structures[29] - as they last longer and are immediately more effective in flood management - instead of focusing on "sustainable" solutions. In Sweden, different types of priority areas within flood protection based on the FD (e.g., health, economic, cultural) gain different importance. Ultimately, the local level will decide on the prioritization. It is argued that decision-making should be made from sound facts and data informing the political process as Sweden was representing on an international EU flood conference (Hegger et al, 2014).

The decentralized approach brings opportunities and challenges. On the one hand, decisions and action can be tailored to local conditions, but on the other hand, municipalities which are vulnerable to flood risks do not have sufficient resources (financial and knowledge) (Ek et al., 2015). And vice versa, the national level is being perceived as rather passive, but many Respondents from different levels would like to have increased support and guidance from the national level. Ideally, a revised or updated national climate strategy with greater impact on the flood risk management is recommended. As the Skåne Country administration has not indicated as of to owhether it is planning to request another climate scenario based on latest data and measuring techniques, I reached out directly to the County of Skåne and specifically to a water strategist at the department of Water and Environment, who confirmed that there were no plans to alter the climate prediction scenarios with more recent datasets.

5.2. Policy Framework Discourse

As already indicated in the previous sub-Chapter the decentralized, integrated approach in Sweden entails various entities to implement coastal flood protection. Sweden is a signatory of many international agreements relating to the concept of sustainable flood

[28] Expressed by all of the Respondents, but Respondent 6.
[29] Grey structures are man-made geoengineered solutions made often of concrete, or steel, with small or no consideration for the ecosystem they are placed in (UNEP et al., 2016).

protection focused on adaptation. Sweden is an active member in reflecting the goals in field of climate change, environmental protection/enhancement, and sustainable future (The Paris Agreement, Ramsar Convention on Wetlands etc.) onto national frameworks (Iberdola, 2021). As an active sustainability-focused EU member state, Sweden is actively implementing its pledges under the WFD, FD, and Biodiversity 2030 Strategy. However, as mentioned earlier, flood protection is not a separate area of policy sector in Sweden. The main body responsible for the promotion of WFD is the Swedish Agency for Marine and Water Management, for FD it is the MSB and for Biodiversity 2030, it is mainly the Swedish Environmental Protection Agency. However, as mentioned by the Respondents[30] Sweden does not have once central entity that would be responsible for FD and WFD but is divided across different actors and institutions. Indeed, apart from the mentioned agencies, there are other important actors who should ensure the effective implementation of these strategies, e.g., the SMHI, the SGI, The Swedish Agency for Marine and Water Management, the counties, municipalities, and even individuals.

[30] Agreed upon by Respondents 1, 2, 5, 8, and 9.

Description	e.g., climate modelling, impact, vulnerability, and/or risk assessments, guidance, and tools for other levels of government, business, and citizens	e.g., land-use planning, building regulations, e.g., stakeholder surveys, quantitative and qualitative indicators measuring climate effects, policy process and policy outcome coastal protection infrastructure standards, economic incentives for risk reduction	e.g., funding of investment in risk reduction; funding for household-level protection measures	e.g., stakeholder surveys, quantitative and qualitative indicators measuring climate effects, policy process and policy outcome

Table 2: Summary of Swedish Evaluation on Flood Protection Infrastructure (OECD, 2019).

The normal result of combining these international and national pledges ends in a single flood protection policy focused mostly on spatial planning. When it comes to coastal flood protection, The Nature Conservation Act of 1974 states that the first 100 - 300m of the coast needs to be free of exploitation. Spatial plans of the different municipalities need to comply with this Act. In addition, new development projects must incorporate a certain safety margin to protect against future erosion or higher water levels. Areas of the coastal zones without private or public interest should not be protected but given back to the sea /managed retreat/ (Climate Change Post, 2021).

In line with the Respondents interviewed[31], the Swedish Commission on Climate and Vulnerability[32] states that the planning basis and basis of knowledge underlying the municipalities' comprehensive land-use and detailed development planning are often too deficient and inaccessible for the municipalities to be able to take account the risks of natural disasters in the present-day and future climate. Municipalities and technical administrations both express their confusion as to which scenario to plan for (for more details see 1.2.). That is particularly difficult for attractive waterside construction in the coastal municipalities, even with the risk of flooding being known. Especially, as the municipalities are mostly financing their flood protection project themselves, they want to also attract more inhabitants through increased urban development[33].

The implementation of international, regional, and legal commitments and regulations are translated at different levels in the Swedish system. Again, this differs across national, regional, municipal, and individual levels.

At the national level, it is primarily the government, the Riksdag[34] and specialized authorities, under a government national strategy for climate change adaptation. The Government's ordinance on the authorities' climate adaptation regulates the work of 32 authorities and all county administrative boards with climate adaptation. Considering their respective areas of responsibility, authorities must initiate, support, and evaluate the work with climate adaptation, including drawing-up action plans for their work with climate adaptation. They must also report their work to SMHI on an annual basis, which according to the government must analyze accounts, submit a summary analysis, and support the authorities in their work with their ordinance. The Government has also given the Boverket the task to coordinate the national climate adaptation work for the built environment. Many laws govern climate adaptation work in Sweden, foremost amongst these are the Planning and Building Act and the Environmental Code. To

[31] This was in particular discussed with Respondens 1, and 5.
[32] The Commission on Climate and Vulnerability was appointed by the Swedish Government in June 2005 to assess regional and local impacts of global climate change on the Swedish society including costs.
[33] That is evident in the evolvement of Ystad and stressed by the Respondent 3.
[34] The Riksdag is the national legislature and the supreme decision-making body of Sweden (Riksdag, 2021).

support the national work, several knowledge-enhancing bodies have been created. The National Council of Experts on Climate Adaptation has the task of evaluating the work with climate adaptation in Sweden. The Expert Council provides a basis for the national climate adaptation strategy every five years. In addition, the National Knowledge Center for Climate Adaptation at SMHI is a node for knowledge about climate adaptation as well as a meeting place for actors in society's climate adaptation.[35]

At the regional level, the county administrative boards coordinate adaptation strategies while ensuring that the governmental-set goals are being met. In addition to this, the counties initiate, support, and evaluate the work of climate adaptation by, among other things, supporting municipal climate adaptation work. County administrative boards are covered by the regulation on the authorities' climate adaptation, which, among other things, entails requirements for drawing up action plans.[36] The County Administrative Board also has the responsibility to monitor whether municipalities apply of the Planning and Building Act, to ensure that land use incorporates climate risks associated with flood, erosion, and landslides (Bahr and Ivarsson, 2020).

Municipalities have an important role in adaptation work at the local level. On the one hand, the municipality is responsible for building permits, environmental supervision, environmental protection, and nature conservation. Their responsibility for climate adaptation was enhanced as late as 2018, when a change in planning and building clarified their need to improve preparedness for climate change (Bahr and Ivarsson, 2020). According to the Planning and Building Act, the municipality must take climate risks into account when planning new buildings. In the master plan[37], the municipality must give its view on the risk of damage to the built environment that may result from floods, landslides, avalanches, and erosion, which are climate-related, and how such risks may decrease or cease.

[35] Based on a communication with Respondent 9.
[36] Also, from Respondent 9.
[37] The master plan is a layout of the upcoming building and development solutions for each city/municipality.

On the other hand, there is several international and national goals and commitments that municipal planning must consider. One such goal which is particularly championed by the specialized agencies and academia in general, is climate adaptation through planned retreat. This is a heavily researched policy solution, which focuses on the scenarios of rising sea levels. When the sea rises and flows into watercourses, the possibility of exploiting or relocating buildings, infrastructure and socially important functions to another more suitable location is rarely discussed. One reason for this may be that planned retreat is a sensitive issue, but it can also be due to ignorance of what planned retreat is and what it means. Hence, a new CAMEL (Climate Adaptation by Managed Realignment) research project is looking into the technical, legal, social and governance barriers that exist at different levels within society, to assess which of these barriers are the most critical and how they can be overcome. This project aims to show how innovative and interactive visualization can clarify obstacles and see what opportunities a planned retreat can contribute to and which can serve as a basis for decision-makers about long-term sustainable land use (SGI, 2018a). To help the implementation and initiate knowledge-sharing between municipalities, a connecting research project is under way: The SEA-RIMS (Sustainable and Ethical Adaptation to Rising Mean Sea levels). The focus is on the ethical and societal questions connected to this managed realignment. The project also aims to generate different future scenarios that describe how to adapt local communities to higher sea levels in a sustainable and ethical way (SGI, 2018b).

Swedish representation in STARFLOOD working group mentioned already in 2013, that the measures taken are prioritized by putting the highest rank on human life because applications of the government subsidies exceed the need by many times. National Government can pay 60% of the costs of Flood Risk Management Measures and local government/estate owners must pay the balance of 40%. Effectively, therefore, prioritization is mainly achieved nationally when it comes to government subsidies and not at the local level. In addition, if any project is built in water, or taking

material from the water it requires a building permit according to the Environmental Act (Hegger et al., 2014). To sum up, while the Swedish decentralized approach to coastal flood policy remains, the understanding of how to achieve "sustainable", "effective" collaboration across all actors is in Sweden dealing with similar issues ever since the implementation of the FD. The area in which the greatest discourse still prevails, is the increase in promotion of flood protection techniques with plausible climate change scenarios (especially the discourse on whether there is a need for increased support from the political arena on this).

6. Discussion

The aim of this thesis was to answer the following research questions: (1) What are the responsibilities of all of the levels of power with respect to the FD in Sweden? and (2) Where are the main obstacles between the successful implementation of the FD in Sweden? While both of these assumptions were answered in the analysis (Question 1, by analysis the roles of different level entities and their areas of concerns, and Question 2, by tracing the divide which is apparent between the municipal and national authorities), there are four important concerns to discuss further.

Firstly, there are concerns and difficulties tied to permitting process in the instalment of flood protection strategies. According to the Swedish legislation, the municipalities must apply for two permits to carry out the flood protection projects. The first should be issued by the Swedish Land and Environment Court (such as the Swedish Water Act (1983: 291) or Environmental Code (1998: 808)), while the second should be given by SGU, which is a Swedish governmental expert agency for issues relating to bedrocks, soil, and groundwater (e.g., the Swedish Continental Shelf Act (1966: 341)). Nonetheless, when it comes to many flood projects, especially in coastal areas, both above-mentioned laws contradict each other marginally. For example, in 2001, Ystad received a permit from the environmental court for the beach nourishment, however

the application was rejected because of the Continental Shelf Act[38]. It took ten years to receive the permit form the Continental Shelf Act, followed by a strict environmental plan.

Secondly, the challenge in how different parts of the county administration have often overlapping responsibilities prevails. As mentioned by all of the Respondents, but the representants of Skåne county administration, such overlays create more confusion and setbacks in the realization of the municipalities´ flood plans. Concretely, with any protection measure the county must be informed and the must approve this measure. The issue is that sometimes different departments of the county administration give contradicting answers on the same question (Ohlsson, 2014). Such inconsistency delays the permitting process, increasing vulnerability to rising seas and erosion [39]. As mentioned by Respondents 8 and 9, the county administration is aware of the necessity of location-specific flood solution as it is due to the rigid political engagement in the national levels which are setting the rules for coastal projects to be evaluated. Indeed, in Autumn 2020, the county administration began to organize an open-panel for the municipality specialist on coast protection to participate in a knowledge sharing workshop/discussion (Lannstyrelse Skåne, 2021d). However, due to the pandemic, the meeting was cancelled. The question remains as to whether the county considers this workshop as valuable in installing a dialogue between/with municipalities, as any attempts to e.g., shift the workshop to latter date, or to offer an online alternative to the meeting were not offered (at least based on the official county administration board website, ibid.). That creates interesting discourses as the county administrative follows the national level agencies onto their counties (Respondent 8, and 9). However, when MSB is presenting Sweden in the international settings (such as the EU STARFLOOD

[38] This Act defines the Continental Shelf of Sweden: it shall mean the sea-bed and its subsoil within Swedish public waters and within such an area of the sea outside the territorial limits as the Government may determine in accordance with the Convention on the Continental Shelf signed at Geneva on 29 April 1958. The term "natural resources of the continental shelf" in this Act includes such living organisms as, at their harvestable stage, are either immobile on or under the sea-bed or are unable of motion (Ecolex, 1966).
[39] Based on the communication with the majority of Respondents.

working group on flooding), MSB states that is the responsibility and the final call of the municipalities to determine the benefits and challenges to local coastal flood protection project installation (Heggert et al., 2014).

Thirdly, the satisfaction of the sustainability criterion is rather unclear in the Swedish adoption of the FD. Indeed, there are no legal requirements on what "sustainable flood management" actually means in praxis. Usually, the municipalities have a policy to manage and protect the waterways and coast using green and nature-enhanced solutions. However, many of the municipalities must adhere to an old act based on the MSB (and the predecessors of MSB) to protect buildings and infrastructure which are deemed to have a high societal value and infrastructure with only concrete, unsustainable projects which take a tool on local ecosystems. Also, in line with Respondents 2, 5, and 6, the climate change scenario adaptation and promotion of sustainable solutions is not fully embedded in the country national and county administration level, which may interfere with the solutions which the municipalities propose.

Fourthly, there is a concern regarding the national promotion of managed retreat as a national strategy to implement the FD. As this strategy is logical in less inhabited parts of Sweden, in counties with higher density of population (such as Skåne) this comes with many issues. The respondents expressed their concerns that because MSB focuses on disasters management in general, their national initiative are too broad and not fitting flood management (not to mention specific project sites). The respondents from municipal and regional levels have expressed their trust in the managed retreat, but as a solution for a farer future for which a gradual, sustainable, economically-viable preparations will be presented, rather than a sudden application with no secondary flood management option. Also, with respect to this strategy, all Respondents have expressed an increased need for monitoring and measurement indicators, tied with the advanced necessity of multi-level data sharing which would help set the scene for such strategy in the future.

In sum, as in the other Scandinavian countries, flood protection policy in Sweden is mainly focused on *integrated* spatial planning. Hence, this *decentralized* approach always presents some challenges in the division of power, if not strictly defined and supported by intense bureaucratic process. That said, laws and regulations need to be adapted; roles and responsibilities as well as *participatory* strategies and goals should be clarified. Furthermore, priority and funding should be given to research and development that fill an identified knowledge-gap, including long-term monitoring. Knowledge and decision support, as well as prognoses and warning systems should be more accessible (to support initiatives such as the regional coast cooperation between Skåne and Halland). There is also a need to outline how the costs of *sustainable* flood management should be distributed among the actors and how resources for prioritized measures can be guaranteed. This must be followed by mentoring performance with clear definition and responsibilities. Especially, as the effects of human intervention and climate change do not wait for more clear structure and division of power, and will hit the coastlines across the world quickly and significantly.

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