

The fragmentation of climate change adaptation – the Sweden case

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Abstract

Purpose – This paper aims to challenge the view of Sweden’s climate leadership by problematizing its domestic climate adaptation governance and highlighting the need for a more holistic view of adaptation. The paper highlights aspects that are troublesome for not only the built environment along coastlines but also the future of Sweden’s standing as a climate leader. The paper concludes with recommendations addressing the key areas of climate adaptation fragmentation in Sweden and calls for a more holistic view of adaptation, and one that takes into account resources, collaboration and coherence of governance vision.

Design/methodology/approach – The paper is a comprehensive analysis of internal governance processes in climate change adaptation. It is based on an extensive literature review and semi-structured interviews at the local level – i.e. municipalities – who have the primary responsibility for adaptation to climate change in Sweden.

Findings – Findings point to three-fold concerns. First, there is a lack of clarity on roles and responsibilities in adaptation among municipalities, regions and governmental agencies. Second, the gap between available finance and actual needs for climate change adaptation presents a major challenge when channels and pathways are not clear either. Finally, some adaptation strategies on both the local and national scales may be maladaptive in the long term.

Originality/value – Sweden consistently ranks highly in different climate performance indices and has acquired an international reputation as a climate leader. The paper challenges this narrative. Through a closer look the paper’s findings reveal a more fragmented picture of climate adaptation governance in the country with a myriad of unresolved questions and *ad hoc* solutions, where adaptation challenges are more pronounced and manifest in the built environment along the coastlines.

Keywords Climate change, Adaptation, Governance, Sweden

Paper type Research paper

1. Introduction

The effects of climate change, and the threat thereof, is an increasing concern for governments across the globe. These challenges manifest differently in different parts of the

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world, but similarly structured countries, or similar economies, share challenges when it comes to mitigation and adaptation (Sarkodie and Strezov, 2019). Strategies of dealing with climate change have evolved from a sole focus on mitigation, to a combination of mitigating, adapting and building resilience (Oels, 2011, pp. 21–22). Since the seminal agreement in Paris in 2015, countries across the globe have developed plans and strategies for how to cope with climate change (United Nations Climate Change, 2024).

Climate change adaptation is about reducing climate risks and vulnerability, mostly through incremental changes in already existing systems [Intergovernmental Panel for Climate Change (IPCC), 2022, p. 20]. This understanding of adaptation, laid out by IPCC, potentially inhibits any radical transformative change, i.e. moving beyond current practices of changes within existing governance systems and structures to challenging or overhauling the actual system. At the same time, this way of viewing adaptation is quite broad, and it “[...] hinges on the multiple and intersecting ways in which people know, experience, and deal with climate change” (Owen, 2020, p. 2), thereby highlighting the contextual nature of climate adaptation. Furthermore, this means that there is no consensus on what constitutes effective adaptation practices (Owen, 2020, p. 1), or even an agreed upon operational unit when it comes to tracking adaptation efforts (Berrang-Ford *et al.*, 2019). Despite this, there are efforts that attempt an overarching analysis about climate change vulnerability and resilience. In a study by Sarkodie and Strezov (2019), 192 countries were examined along specific metrics to assess countries’ vulnerability and adaptive capacity (*ibid.*, p. 150). This analysis does not investigate deeper governance issues or adaptation practices but is focused on broad generalizable conclusions and the possibility of adaptation practices, which gives a good overview of challenges and capacities that are common among developed and developing states (*ibid.*, p. 163).

Despite this lack of clarity when it comes to effective adaptation practices, adaptation challenges seem to be more typical, especially when examining developed economies (Sarkodie and Strezov, 2019). The general challenges are mainly centered around financial challenges, which also include financial relationships between developed and developing countries (Bigger and Millington, 2020; Eisenstadt *et al.*, 2021), lack of capacity and responsibility (Artur *et al.*, 2018), absence of legislative clarity in the built environment (Kristl *et al.*, 2020), institutional response to the adaptation challenges (Kristl *et al.*, 2020; Valente and Veloso-Gomes, 2020) and the complexities within coastal cities (Valente and Veloso-Gomes, 2020).

Specific studies in Sweden highlight very similar challenges (Persson *et al.*, 2021; Olsson, 2018; Juhola *et al.*, 2016; Glaas, 2013; Storbjörk, 2007). The most pressing of which in Sweden are: the responsibility for adaptation, and answering the question “*who does what?*” (Persson *et al.*, 2021, p. 1); financing climate adaptation efforts, answering the question “*who should pay?*” (Glaas, 2013; Storbjörk, 2007); uncertainty and maladaptation, answering the question “*how do we know we are doing the right thing?*” (Olsson, 2018). These issues exist alongside the argument that Sweden is a climate leader (*ibid.*, p. 2) consistently ranking high in climate performance indices (Burck *et al.*, 2020; ND-GAIN Country Rankings, 2022; Sachs *et al.*, 2016). This may not be an outright contradiction, yet it is an aspect worth expanding on to challenge this view of Sweden as a climate leader who has overcome most adaptation challenges.

Against this backdrop of adaptation challenges, this paper will attempt to thoroughly explain how the Swedish system for climate adaptation is set up, highlight some challenges that has been identified and suggest some recommendations for how to incorporate and hopefully solve these challenges. Moreover, the paper will untangle some of the unresolved questions and thoroughly explain how these contribute to a fragmented governance of climate adaptation.

2. Methodology

This paper is based on the findings of a multinational EU Erasmus + funded BEACON Project (Built Environment Learning for Climate Adaptation). BEACON is a collaborative three-year research initiative that aims to develop trans-disciplinary and innovative research-based learning in the built environment to tackle climate change in coastal regions. Universities from the UK (University of Huddersfield), Sweden (Lund University), Sri Lanka (University of Colombo and University of Moratuwa), Spain (Universidad De Cantabria) and Malta (L-Universita 'ta'Malta) were the main partners in the project and formed the multiple case studies for empirical data collection and analysis. The project objectives are to:

- identify climate change impact on the built environment in coastal regions;
- develop a coherent framework for integrating the requirements of the Paris Agreement with the Sustainable Development Goals (SDGs) and the Sendai Framework for Disaster Risk Reduction 2015–2030 (SFDRR) in the context of the impact of climate change on the built environment in coastal regions;
- recognize the opportunities for climate adaptation in the coastal built environment in line with the coherent framework;
- understand skills gaps in climate adaptation in the built environment to tackle climate change in coastal regions; and
- develop a trans-disciplinary and innovative research-based learning to improve competencies in climate change adaptation in the built environment in coastal regions.

Within this project, the structure of Sweden's climate change adaptation has been examined from multiple angles, for a variety of purposes and through different methods. All the methods used has informed this article.

2.1 Literature review

First, an extensive literature review was conducted. This secondary material explains different parts of the climate adaptation scheme in Sweden. The literature considered were reports from state-run investigations; key pieces of legislation, most notably the plan – and building act and the environmental charter; investigations by key actors in the field, such as county administrative boards, the civil contingency agency, different municipalities, the housing authority, among others; reports from the climate policy council; and the report from the expert council on climate adaptation.

2.2 Semi-structured interviews

Second, primary data was collected through semi-structured interviews with nine professionals, spread between local government officials and key informants selected based on their close involvement in climate change adaptation practices in Sweden. Interviewees were mainly selected from southern Sweden where most of the effects of climate change are felt, and where adaptation work is most prevalent. Interviews coincided with a highly pressured time of an election year/period in Sweden, which posed some limitation on availability of individuals especially on the local and regional levels. In all, nine climate adaptation practitioners from the private sector, the public sector in municipalities, regional and national level and the local sector with a housing union were interviewed. These interviews were conducted between late September and throughout October of 2022. The interviews took roughly 1 hour each and were conducted online following interview protocol and guidelines produced by the BEACON project. The guidelines consisted of three interrelated parts, besides the organization and interviewee details. The first part covered the role of the built environment stakeholders and

professionals with questions about how the interviewees' organization worked with climate change. The second part looked at the skill gaps and mismatches, where the questions were more extensive and were aimed to find out if the interviewees experienced any skill gaps in their organization. The third and last part probed into case studies and best practices that the interviewees wished to highlight.

2.3 Other sources of information

Finally, other supplementary data was gathered through an internship of the first author at the county administrative board in Skåne from August 25 to November 1. This led to participation in one national conference of climate adaptation where all relevant actors were present, as well as three different regional conferences with different focus areas in Skåne and its proximity. Moreover, participation in weekly meetings about climate adaptation issues in Skåne, as well as societal planning meetings in which climate adaptation challenges on a building and neighborhood scale were discussed also proved to be a valuable source of insights and supplementary data, especially on the functioning and procedures of local, regional and national government levels in climate adaptation in the country.

This process, together with the thus far over 2.5 years on the BEACON project, have yielded a thorough understanding of the architecture of the Swedish climate adaptation system.

3. Background and literature review

In Sweden, climate adaptation is the responsibility of the municipalities, but the system in which they work is influenced by national agencies, regional actors, the private sector and legislation, which creates their framework of working with the question. The purpose of this section is to unpack and elaborate how this complex multi-dimensional jigsaw puzzle fits together – or if it does. This will be described through three different lenses, the local, the regional and the national.

3.1 Local

At the local level, climate adaptation in Sweden is primarily the responsibility of municipalities. Administratively, Sweden is divided into 21 counties (regions) and 290 municipalities (local). Local governments in Sweden play a central role in the governance of climate adaptation ([Statens Offentliga Utredningar, 2017](#), pp. 326–327), especially those professionals working in city planning or in county administrative boards ([Olsson, 2018](#)). One key aspect of local adaptation efforts is the building monopoly held by municipalities, which stipulate that the municipality is the sole actor that regulate the construction, use of buildings and land-use planning, within their boundaries ([Statens Offentliga Utredningar, 2017](#)).

The Planning and Building Act (PBL) is another important piece of legislation that shapes local climate adaptation efforts in Sweden. The PBL establishes the general principles for land-use planning, including some provisions for addressing climate risks (Plan and Building Act, 2010) For example, municipalities are required, at least theoretically, to consider the impact of climate change when preparing plans for land use, and to include measures for mitigating and adapting to potential climate impacts ([Wamsler and Brink, 2014](#)). The PBL states that planning and permission for land and water areas usage shall be given to those purposes that the area is most suitable for, taking into account nature, location and needs, and that preference is given for usage of a sustainable nature (*2§, 2nd chapter, PBL*). The interpretation of this specific paragraph is key to how climate adaptation is governed (Anonymous interviewee #1).

Connecting to this is The Environmental Code (Miljöbalken). This code contains provisions for the protection of the natural environment, including measures to address the impacts of climate change (Swedish Environmental Code, 1998). For example, municipalities are required to assess the potential environmental impacts of development projects, including climate risks, and to take steps to mitigate against or compensate for any negative impacts (Olsson, 2018). Depending on who one might ask, the environmental code and PBL, are the two key pieces of legislation where support for climate adaptation strategies and decisions are found (Anonymous interviewee #2). Which one takes precedence seem to be related to in which sector/department climate adaptation practitioners are working, because there is not one uniform organizational structure in all municipalities, counties or state agencies. Climate adaptation practitioners can be working within units in spatial planning, environmental management, environmental strategy work, risk and preparedness or possibly others.

In addition to these two legal frameworks, municipalities in Sweden are also responsible for creating oversight plans to address climate risks (Statens Offentliga Utredningar, 2017). These plans are not legally binding (Plan and Building Act, 2010), but a strong argument and rationale needs to be presented for why a detailed plan goes against the oversight plan, and this must be approved by the county administrative board for it to be allowed. These plans have a formal obligation to include measures that help infrastructure to withstand extreme weather events, although this is not praxis for how oversight plans are used (Statens Offentliga Utredningar, 2017). They could also be used to promote sustainable land-use practices (Wamsler *et al.*, 2020).

Overall, the local level plays a crucial role in climate adaptation in Sweden, and municipalities have a range of tools at their disposal to address climate risks (Statens Offentliga Utredningar, 2017). However, there are also challenges to effective adaptation at the local level, including limited resources and expertise (Wamsler and Brink, 2014), and the need to coordinate with other levels of governance and with the private sector (Becker, 2021). This will be further elaborated on later in the paper.

3.2 Regional

At the regional level, climate adaptation in Sweden is influenced by county administrative boards in all 21 of Sweden's regions, and regional oversight plans in two, Stockholm and Skåne (Government proposition, 2017; Region Skåne, 2022), although the one from Stockholm is not yet completed. County administrative boards in Sweden play a key role in the governance of climate adaptation, particularly in relation to land-use planning and infrastructure development (Olsson, 2018). They are responsible for coordinating adaptation efforts within their region and for ensuring that municipalities comply with relevant legislation and guidance (Statens Offentliga Utredningar, 2017). County boards are the gatekeeper that can overturn or reject any land-use planning decisions made by the municipality.

Beyond the county administrative board, there is the region, a political entity that has overlapping duties with the county administrative board and that oversees the development of the regional oversight plan (Government proposition, 2017; Region Skåne, 2022). In terms of climate adaptation, the region does not have any responsibilities whatsoever, the only avenue where climate adaptation becomes relevant for them is through the work with the regional oversight plan, which has climate adaptation as one focus area among dozens of others (*ibid.*).

In addition to these formal structures, regional actors such as businesses and civil society organizations may also play a role in climate adaptation efforts at the regional level in

Sweden (interviewee, Lomma municipality). For example, they may participate in the development of regional oversight plans or contribute to adaptation efforts through their own initiatives and activities. Although, it must be emphasized how comparatively little influence and power the private and civil sector has in comparison with the public administration of the municipality and county administrative boards, and to some extent, the region.

3.3 National

At the national level, climate adaptation in Sweden is governed by the [Climate Ordinance \(2018:1428\)](#) and other national legislation, policies and guidance. The Climate Ordinance establishes the overall framework for adaptation in Sweden, including the goals and principles that should guide adaptation efforts, as well as the roles and responsibilities of different actors. For example, the ordinance requires the government to set national adaptation goals and to develop an action plan outlining the measures that will be taken to achieve these goals. This action plan is reviewed and updated regularly to ensure that Sweden is on track to meet its adaptation goals (ibid.).

In addition to the Climate Ordinance, national policies and guidance also play a role in shaping climate adaptation efforts in Sweden. For example, the government may issue directives or recommendations to guide the work of local and regional actors on adaptation ([Statens Offentliga Utredningar, 2017](#)). The Swedish meteorological and hydrological institute (SMHI) is the governmental agency that is in charge of national coordination and collaboration in the sphere of climate adaptation and is the national agency that is given the most responsibility ([Climate Ordinance, 2018](#)). SMHI is in charge of following up on and reviewing all governmental agencies climate adaptation progress, of developing a methodology for how to achieve this, and of educating and advising all other actors that are in the scope of the climate ordinance (ibid.).

Another key national agency when it comes to climate adaptation in the built environment is the Housing Authority ([Olsson, 2018](#)). The Housing Authority oversees the establishment of guidelines for how municipalities can interpret the plan and building act through the “Plan and building act knowledge bank” ([Boverket, 2023](#)). They are the national agency that has the most to do with land-use planning in the municipalities, together with the county administrative board of the respective county. Similar to SMHI, the Housing Authority does not have any operative tasks, or any specific collaborations with the municipalities, but is mainly concerned with implementing and adjusting guidelines.

In general, the national level plays a crucial role in establishing the overall framework and direction for climate adaptation in Sweden. However, there are also challenges to effective adaptation at the national level, including the need to balance the interests of different stakeholders and to coordinate with other levels of governance ([Olsson, 2018](#)).

In conclusion, the different governance levels within Sweden shape climate adaptation in different ways, but there is no way around the significant importance of the local level, especially municipalities. In the end, if anything goes wrong, it is either the municipality that is responsible, for the first ten years after a plan is approved, or the property/landowner, after those ten years ([Olsson, 2018](#), p. 28).

3.4 Hierarchy of legislation, guidelines, policies and reports

This section is a purely descriptive one of the key pieces of legislation, guidelines, forums and policies that shape climate adaptation governance. The focus on these specific documents is guided by the interview process, previous academic literature, as well as experience from the county administrative board in Skåne. This list of key documents is not

entirely exhaustive because how adaptation is conceptualized and governed may differ between different municipalities, CABs and national agencies. Although, as argued previously, it is mainly through spatial planning that climate adaptation is brought in as a focal point, the following documents and forums all have some bearing and relevance on spatial planning.

One of the two most important legislations that guide practitioners on climate adaptation matters is the Plan and Building Act (Plan and Building Act, 2010; [Statens Offentliga Utredningar, 2017](#)). This legislation covers regulation about land-use planning, including the key paragraph for climate adaptation purposes 2§, 2nd chapter of the PBL (Plan and Building Act, 2010).

The other legislation frequently pointed to by climate adaptation officers is the environmental charter ([Swedish Environmental Code, 1998](#)). The environmental charter has as its overall aim to protect the health and avoid damages for people and the environment (*ibid.*). Its use in climate adaptation work is not as focused as with the Plan and Building Act but instead covers a wide array of questions. Including, but not limited to, the precautionary principle – which says that planning must be made recognizing the insecurities in the future climate and therefore implementing some safety margin in everything; environmental assessments – how certain projects can affect the environment, now and in the future; how climate change may affect businesses dealing with dangerous substances such as chemicals, toxins, etc. ([Naturvårdsverket, 2024](#)).

The [Climate Ordinance \(2018\)](#) regulates who is responsible for what when it comes to climate adaptation. This was an issue that was brought up by almost all interviewees and is something that previous literature highlights as a point of contestation.

On a regional level, there is a regional action plan made by every CAB in Sweden. This plan lays out that CAB strategy for working with climate adaptation, this is often done on the basis of a climate and vulnerability analysis, as CABs must do to follow the [Climate Ordinance \(2018\)](#).

On a municipal level, there are three plans/documents that are key for climate adaptation. First, a climate adaptation plan, although it is not a requirement for municipalities to have such a document, the work with climate adaptation could be more integrated into other processes. Second, the oversight plans, which broadly shape the development of the entire municipality, especially concerning land management. This document is connected mainly to spatial planning, but as argued above, climate adaptation goes hand in hand with that in Sweden. Third is the municipalities' water strategy, which is often administered by a water and sewage company that is spanning over several municipalities. These quasi-municipal organizations are in charge of certain types of flooding and how to cope with these from a climate adaptation standpoint.

Beyond the legislative and document/plan focused aspects above, there are certain forums that shape the work of climate adaptation.

The most informative one as of yet is the investigation done by Sweden's public investigations ([Statens Offentliga Utredningar, 2017](#)). This is the investigation that laid the foundation for certain legal changes in the Plan and Building Act, as well as the foundation for the climate ordinance ([Environment and energy department, 2018](#)). This investigation also alludes to several of the problems brought up in academic literature, by the interviewees and from the first authors experience from the CAB in Skåne.

As part of Sweden's climate adaptation strategy, an expert council for climate adaptation was enacted ([Environment and energy department, 2017](#)). This council has the task to write a report every five years to guide the national climate adaptation strategy. The first report was released in early 2022 ([Schultze *et al.*, 2022](#)). This report further elaborates on issues that

was brought up in the investigation in 2017, it also includes suggestions of how the climate adaptation work should continue moving forward.

These specific legislations, documents and key reports have been chosen due to their importance in climate adaptation, and all of these was brought up in the interviews with practitioners in the field.

4. Results and discussion

Having established how this paper conceptualizes climate change adaptation in Sweden, which legal frameworks are essential and which governance level is responsible for which aspect of climate adaptation, the paper will now turn to discussing the challenges within this system. The challenges are the outcome of the analysis and methods explained above, with the interviews of practitioners in the field constituting the main source of information.

With the interviews as a starting point of what to focus on, this paper has then contrasted and triangulated such views with peer-reviewed academic literature, as well as several reports done by different actors in the field to construct a narrative about the fragmented nature of Swedish climate adaptation governance.

This section will first discuss how roles and responsibilities are divided, something that almost all interviewees describe as confusing and problematic. The section will follow onto exploring how climate change adaptation is, can or should be, financed, which is another key aspect brought up in the interviews. Finally, this section will conclude with the issue of how these two fragmented processes of responsibilities and financing can lead to maladaptive processes – an issue that was more highlighted in previous academic literature than in the interviews.

4.1 Roles and responsibilities

Through a thorough reading of the key pieces of legislation including: PBL (Plan and Building Act, 2010) and The Environmental Charter ([Swedish Environmental Code, 1998](#)), the [Climate Ordinance \(2018\)](#) and the state investigation about responsibility ([Statens Offentliga Utredningar, 2017](#)), there is not much confusion or ambiguity about who is responsible when it comes to climate change adaptation.

First, there is no single entity that is responsible for climate change adaptation in Sweden. All agencies that are mentioned in the [Climate Ordinance \(2018\)](#) have certain obligations. They must perform a climate and vulnerability analysis, produce a climate adaptation action plan, and identify legislation that affects their work and climate adaptation (*ibid.*). Certain “extra” responsibilities are given to the county administrative boards, to SMHI, and more recently to the Housing Authority. The county administrative boards are responsible for following up on municipal climate adaptation work, improve documentation and knowledge, and analyze regional effects of climate change (*ibid.*). SMHI is responsible for reporting on all agencies progress and forward these reports to the central government, in a way they see fit (*ibid.*). The Housing Authority has more recently, in 2021, been tasked with coordinating climate adaptation in the built environment ([Boverket, 2021a](#)).

Second, due to the municipalities’ monopoly on planning each municipality oversees planning in accordance with PBL, the key paragraph of which is highlighted above concerning the suitability of a plan to be accepted (*2§, 2nd chapter, PBL*). Spatial planning is highlighted as the key arena in which climate adaptation takes place ([Statens Offentliga Utredningar, 2017](#); [Olsson, 2018](#)), which renders municipalities one of the, if not the, most powerful actors in climate adaptation in Sweden.

Third, the property/landowner is the primary bearer of any type of risk, no matter if this is a private individual, a company, the municipality or someone/thing else

(Statens Offentliga Utredningar, 2017, p. 38; Lundh *et al.*, 2022, p. 38). This further means that the primary responsibility for protecting an area lies with the property/landowner.

Finally, protecting property that has already been built, and which has thereby not been scrutinized from a climate adaptation perspective, is the responsibility of the property/landowner (Lundh *et al.*, 2022). There are certain regulations that affect already existing structures that has a bearing on climate adaptation, such as the requirement that the property and land must be kept in sufficiently good condition, and that the technical integrity of a property is maintained, etc., although there are no explicit obligations to adapt one's land to a changing climate (*ibid.*).

This may look complicated in terms of responsibilities, and it may be, but in the eyes of the government and existing legalization, it is a clear divide of roles and responsibilities when it comes to climate adaptation. Yet, from the interviews, the experience of one of the authors at the county administrative board during an internship, and previous academic literature all reveal an even more complicated picture in which the roles and responsibilities are scattered and fragmented.

Out of the nine interviews with climate adaptation practitioners, seven emphasized that one of the key challenges in climate adaptation within their respective focus areas was the question of who is responsible for what. The interviewees referred to here included: a water and sewage company in the south of Sweden, VA Syd, which is owned collectively by several neighboring municipalities and which is in charge of water management and coping with the risk of pluvial flooding; a project leader in an organization, which guides several municipalities in, among other questions, climate adaptation called the Gothenburg Municipal Association; a senior climate adaptation officer in the leading municipality when it comes to climate adaptation, Lomma (Matschke Ekholm *et al.*, 2021); a researcher in the Swedish research institute, RISE; and three interviewees that have chosen to remain anonymous. From this admittedly small sample, albeit a very focused group of practitioners who work with these questions every day, roles and responsibilities were not experienced as clear-cut.

Despite the relative clarity of the [Climate Ordinance \(2018\)](#), the different organizations that are responsible for the different aspects of adaptation differ significantly in their internal structures. It is not only the organizations that are mentioned in the climate ordinance that differ, also the municipalities are free to govern themselves as they see fit, as highlighted by the interviewee with RISE. This can pose significant problems for collaboration between municipalities, between counties, between national agencies or between any of these governance levels, because what is meant by climate adaptation may differ significantly. As an example, two of the biggest county boards, Skåne and Västra Götaland, which have partly similar problems regarding flooding, and somewhat erosion, have their climate adaptation experts in different departments. In Skåne, the climate adaptation unit works together with the department of spatial planning. In Västra Götaland, the unit works with the department of environmental protection. This means that the everyday questions that they work with differ in their approach to climate adaptation. One could attend daily meetings about spatial planning questions and review detailed plans brought up by the municipalities, while the other is working with polluted areas or how to help industries adapt. Even though everyone recognizes the importance and necessity of adapting the built environment, this question can be approached from very different directions, which may lead to different focal points and different priorities. Without a responsible entity for climate adaptation, there is no coherence in how the question should be worked with, instead different organizations structure themselves differently.

Another example of fragmentation is the following up on municipal climate adaptation progress. SMHI is the agency that is given the broadest responsibility in the [Climate Ordinance \(2018\)](#) and is highlighted by the interviewee at VA Syd as the key player that decides on the “frames” of climate adaptation. SMHI is tasked with following up on municipal climate adaptation work among other things. This task is fulfilled through a survey that is sent out to all municipalities in which they answer a series of questions about climate adaptation connected to their geographical area. The latest published summary of this yearly survey is the results from 2019, where the response rate was about 78% ([Sjöberg et al., 2020](#)). The survey is shaped as a self-estimation survey where the municipalities themselves answer yes or no, with the option to elaborate their answer, to a series of questions. The questions are about if they have any type of action plan for adaptation, which natural hazard they have taken action against and what difficulties with the climate adaptation work they experience (*ibid.*). These questions immediately shape climate adaptation as a form of disaster preparedness, and completely misses any transformative aspects that could be included. Moreover, the reports states that there may be changes to this methodology in future reports (*ibid.*, p. 2), but we have no way of knowing if that has been done, or how many have answered the most recent KLIRA survey, because SMHI has not published any reports since the one analyzing the results from 2019. The information that SMHI then sends to the government of how climate adaptation work is progressing in the municipalities is hidden from the public eye, and currently immune to scrutiny.

Some municipalities experience this survey as something they just “have to fill in,” and not something that benefits them, so the time they spend on elaborating a clear answer is often very brief. Moreover, there is another survey sent out by IVL, the Swedish environmental institute, in collaboration with the insurance industry, that aims to rank municipalities climate adaptation work ([Matschke Ekholm et al., 2021](#)). These two surveys are done independently, although they are both attempt at achieving the same thing, i.e. following up on municipal climate adaptation work. This lack of coherence and collaboration puts the burden of filling these surveys on the municipalities themselves, which can lead to a lack of interest in filling in the surveys in the long run.

Another key actor that several interviewees pointed at is the Housing Authority. Their purpose within climate adaptation is to coordinate climate adaptation in the built environment. The Housing Authority has focused specifically on education, future sea level rise and financing and responsibilities since 2021 ([Schultze et al., 2022](#)). They are tasked to fulfil their obligation in collaboration with SMHI, Swedish Geological Institute (SGI), the county administrative boards and the Swedish Civil Contingencies Agency (MSB) (*ibid.*). This has been done through arranging workshops, conferences, releasing reports, etc. ([Boverket, 2021a](#)). However, the collaborating actors only consist of three county boards, out of the 21 that exist in Sweden (*ibid.*). It may be important to limit a working group of this type for more efficient processes and progress, but because the structure, challenges and way of conceptualizing climate adaptation differ between different counties, the input and output to and from this working group may only be relevant or specific to a few geographical areas in Sweden. This is not to say that this collaboration is not functioning, because they have several outputs that guide municipalities about climate adaptation in the built environment, but it may not cover all aspects of the question because of the differences between the different structures.

When it comes to who is responsible for a certain piece of land, or a structure, the mismatch of responsibilities becomes even more apparent. As the senior adaptation expert

in Lomma municipality highlights, the strength of ownership when it comes to land in risk areas poses a threat to any form of holistic climate adaptation governance. The landowner bears the financial risk if anything were to happen to that land, this also applies in areas that are threatened by changing climate. In new projects, the municipality can make the assessment that land is suitable for development and to be built on, despite possible risks of erosion, flooding, accidents, heatwaves, etc., and can be held accountable legally and financially for ten years after the plan has been approved (Olsson, 2018, p. 28). After those ten years, the burden is on the landowner, even if that area was deemed as a risk area from the start. And, while the responsibility to protect and adapt land lies with the landowner, most effects of climate change on land are too large and significant for a single landowner to be able to cope with, apart from maybe building a modest structure to protect from flooding. This right/responsibility of managing land makes it difficult for municipalities to implement large-scale adaptation efforts. This legal structure partly puts costly responsibilities of protecting land on individuals who may not be able to afford it, and it partly inhibits larger climate adaptation projects from the municipality.

To elaborate further on complexities within responsibilities of land management, even if a municipality would accept to pay for a climate adaptation initiative on an individual's land they are not legally allowed to do so because of the "municipality competence." This is a framework that dictates what municipalities are allowed to do (Andersson and Nilsson, 2021, p. 9). When it comes to climate adaptation, the municipality can act in the "public interest," thereby having climate adaptation projects to ensure the future safety of streets, hospitals, schools or other public buildings. When it comes to properties owned by private individuals, it is not as straightforward. The equality principle (3§ 2kap Kommunallag, 2017:725) states that the municipality is not allowed to "favor" certain members over others, which could be the interpretation if they finance a climate adaptation effort for a property owned by someone other than the municipality (Andersson and Nilsson, 2021, pp. 13-14). How many buildings they must protect with a funded adaptation efforts for it to count as in the "public interest" is not regulated, although according to Andersson and Nilsson (2021) in their legal review probably somewhere between 20 and 30.

The roles and responsibilities of the different actors in climate adaptation is quite complex, and the situation is not made any better by how the financing of climate adaptation is structured.

4.2 Finance and needs

Given the partly mismatched roles and responsibilities within climate adaptation, the question of who is paying for what becomes quite difficult. This is a problem very much connected to that of responsibilities and which runs through all governance levels. As previously noted, the burden of financing climate adaptation efforts lies almost exclusively with the property owner, no matter who that is. In the Housing Authorities work with climate adaptation, they have pieced together an estimate of how much it will cost for coastal municipalities to deal with the consequences of climate change until 2100, estimated around SEK 100bn (approximately US\$10bn at the time of writing) (Boverket, 2021b). The question is who is supposed to pay to prevent coastal flooding and erosion from damaging the coastal municipalities. This also neglects non-coastal municipalities, or other forms of climate adaptation efforts, that may be needed. Access to funding for climate adaptation is a widespread problem in Sweden, and one that is highlighted through SMHI's municipal survey tool KLIRA and by the county boards in their reporting to SMHI (Schultze *et al.*, 2022). Only 40% of municipalities have explicitly put resources, both monetary and personnel to work with climate adaptation (*ibid.*, p. 457).

Although there are funds available from different projects to help with financing property owners to adapt and protect their own land, all of which are explained by SMHI in their website, Klimatanpassning.se [[Swedish Metrological and Hydrological Institute \(SMHI\), 2024](#)], several of these funding applications require someone at a municipality to go through quite a complex application process, which can be very time consuming, as one interviewee emphasized. For smaller municipalities, that may only have an employee working with climate adaptation and only part-time, it can be impossible to fit such a detailed and complex task into an already busy schedule and an overworked personnel. One of the most important funding mechanisms is MSB's fund 2:2 for prevention of natural accidents ([Boverket, 2021b](#); [Bahr and Ivarsson, 2020](#)). This fund paid out just over SEK235m in 2022 ([Civil Contingency Agency and MSB, 2022](#)), and approximate overall applications for funds was somewhere between SEK300m and SEK400m ([Bahr and Ivarsson, 2020](#), p. 25). Only municipalities can apply to this fund, and the selection of which projects to fund is done in collaboration with SMHI and SGI (*ibid.*). This fund values large-scale projects over smaller ones, and with their collaboration partners puts emphasis on technical solutions, because it is aimed to prevent natural accidents, not specifically climate adaptation. This means that the fund is very difficult for smaller municipalities to access, partly because of the extensive application process which require human resources and partly because small-scale projects in smaller municipalities are less likely to be approved when competing with larger schemes from bigger municipalities. Looking at how these funds were distributed in 2022, there is a total of 15 municipalities that received funding for projects (MSB, 2022). That is 15 of Sweden's 290 municipalities that collected money through this mechanism last year, yet it was highlighted as one of the key mechanisms to receive funding for climate adaptation by several interviewees, and in previous reports (see [Boverket, 2021b](#); [Bahr and Ivarsson, 2020](#); [Schultze et al., 2022](#)). There are other forms of project funding that are available through different processes, be it research grants, EU funding, from different agencies, etc. How much money is available through these programs differ each year, which makes it quite difficult for long-term planning for municipalities.

Beyond the "special" grants or programs that fund climate adaptation, there is one quite obvious pathway, taxes. All municipalities in Sweden have revenue each year from local tax – on average, 66% of their budget [[Sweden's Regions and Municipalities \(SKR\), 2022](#)]. To fund climate adaptation efforts through taxes, or through a municipal charge similar to the one for water and sewage that most, if not all municipalities have in place, has been suggested as one avenue ([Andersson and Nilsson, 2021](#)). At a first glance, this seems like a reasonable idea for a long-term solution of financing climate adaptation. Although, the complexities of making this suggestion a reality is manifold. Two specific issues are especially prevalent.

First, this would mean that certain municipalities, which have larger problems with climate change impact, mainly erosion and flooding ([Schultze et al., 2022](#)), would need a significantly higher taxes or tax base to cover these costs. Local income taxes differ between municipalities. Local income tax rates is one of the criteria on which citizens base their decision on where to look for work and live. Raising local taxes would create a challenge and a disincentive to attract and retain citizens that are willing to live in the municipality and consequently contribute to climate adaptation funding. On the other hand, this process may already be underway because it is currently every landowner's responsibility to finance this kind of work. Meaning that if citizens know of this problematization, these properties would likely lose value. As of yet, this has not

happened, more than likely because the insurance industry is still insuring properties in risk areas.

Second, current legislation makes it near impossible for municipalities to raise these climate adaptation funding through taxes or fees (Andersson and Nilsson, 2021). In current legislation, municipalities are not obligated to provide any form of climate adaptation to citizens (ibid.). Whether municipalities are allowed to charge a “climate adaptation fee” is quite unclear. That rests on the question if the municipality is allowed to provide services within the framework of the “municipal competence,” which is not specifically regulated, but rests on praxis decided in court cases (ibid., p. 9). As of the time of writing, there has not been a court case to try this question. Funding climate adaptation through income taxes on a local level, or general climate adaptation taxes on a national level would both require changes to tax legislation (Bahr and Ivarsson, 2020, p. 37).

In a recent research project about the responsibility of climate adaptation in Sweden, Persson *et al.* (2021, pp. 7-8) asked the public if they thought the local government should pay for climate adaptation efforts on an individual’s land if they could not finance it themselves, and the results were quite significantly in favor of that notion. This means that people generally believe that local government is the entity that should fund climate adaptation. Although, as highlighted above, this is often not possible, and can even be illegal for the municipality to do.

4.3 Maladaptation

Considering the confusing roles and responsibilities and the lack of clear financial pathways, Sweden may be at the risk of implementing processes that are maladaptive in the long term.

One of the main, overarching, aspects to the notion of maladaptation is that of a lack of a holistic view on what climate adaptation is (Wamsler and Brink, 2014; Fedele *et al.*, 2019; Glaas *et al.*, 2021). Climate adaptation is generally understood as a technical area, where “hard” physical solutions are pursued (Wamsler and Brink, 2014). This aspect was highlighted by five of the nine interviewees as a lack of holistic thinking in the realm of climate adaptation. Technical measures are important for adapting society to climate change, but to reduce vulnerabilities that exist in different ways in society, societal measures are equally important (Fedele *et al.*, 2019; Glaas *et al.*, 2021). The recent trend on transformative adaptation (Fedele *et al.*, 2019) speaks of the importance of implementing major system changes, and not get too stuck in the technical aspects of incremental solutions. In Sweden, it is quite clear that physical measures dominate the climate adaptation agenda. From whom is responsible for it, SMHI, spatial planning experts, SGI, Housing Authority, municipality leaderships, etc. to the very limited financial opportunities that exist, Fund 2:2 to build physical structures to protect against natural accidents, the discussion about using a fee similar to the one for water and sewage to build climate adaptation measures, etc. (Schultze *et al.*, 2022). How climate adaptation is governed is shaping the very framework for actors in how they can possibly deal with climate adaptation issues, and as long as the focus is so heavily on technical capacities and physical or engineering structures from the highest governance level, a more transformational, holistic approach will be quite difficult.

As discussed above, there is a lack of clear roles and responsibilities among different actors in the system, which can lead to fragmentation and inefficiency in the adaptation process (Becker, 2021; Wamsler and Brink, 2014). This can result in a lack of coordination in decision-making and the implementation of adaptation measures, leading to a suboptimal

use of resources and a failure to address the most pressing climate risks (Wamsler and Brink, 2014).

Another area where evidence suggests the potential for maladaptation is in the lack of citizen engagement and participation in the adaptation process. Citizens are often not involved in decision-making or in the implementation of adaptation measures (Brink and Wamsler, 2019). This can lead to a lack of buy-in and support for adaptation efforts, as well as a failure to address the specific needs and concerns of vulnerable communities [Intergovernmental Panel for Climate Change (IPCC), 2014, p. 209]. The interviewed climate adaptation officer from the Lomma municipality highlighted clear communication and citizen participation in all climate adaptation projects as two key success factors. Involving the public can create long-term safety for projects, it can help persuade politicians to fund certain climate adaptation projects, and it raises awareness and knowledge levels about the necessity of climate adaptation.

Additionally, the lack of proper financing mechanisms for adaptation measures in Sweden can also lead to maladaptation. The state does not provide direct funding for municipalities to implement adaptation measures and the mechanisms for financing adaptation are not clear (Statens Offentliga Utredningar, 2017; Andersson and Nilsson, 2021). This has led to municipalities having to rely on their own resources to fund adaptation measures, which is especially challenging for small municipalities with limited resources. This can lead to inadequate funding for necessary adaptation measures, resulting in a failure to address the risks of climate change effectively.

Furthermore, there has been a lack of clear adaptation strategies and plans, which can make it difficult for municipalities to effectively address climate risks. This lack of clear guidance can lead to a lack of consistency in adaptation efforts among municipalities. It can also lead to practitioners working outside the system, as one interviewee who wished to remain anonymous put it: "It should be more steered by processes, today you just need to know the right person to turn to." This means that certain municipalities, counties or agencies become reliant on that single individual who knows how to "work the system" to get things done, which is helpful in the short term, but not a policy and possibly detrimental in the long term because it hides the fact that the system is flawed.

Overall, the data and literature show a link between current policies and practices in the Swedish climate adaptation governance system and the risk of maladaptation. The lack of coordination and collaboration between different levels of government, lack of citizen engagement and participation, inadequate financing mechanisms and lack of clear adaptation strategies and plans all contribute to the potential for maladaptation. It is crucial that these issues are addressed to ensure that adaptation efforts in Sweden are effective in addressing the risks of climate change.

5. Conclusion

The aim of this paper is to critically analyze Sweden's climate adaptation governance. Having set itself as an international leader in climate work, Sweden is often praised for its actions, yet the internal work with climate adaptation in Sweden suffers from lack of coherent governance vision, lack of resources and few clear collaboration avenues. This inherent lack of a holistic approach to climate adaptation is worrisome. The findings in this deep dive into climate adaptation governance in Sweden contributes to the pre-existing narrative of a governance model that is fragmented. The key issues brought forward by the practitioners in the field are manifold. These issues have been described and connected to previous academic work to further highlight the fragmented approach to climate adaptation in Sweden. The challenges experienced by practitioners in the field

exist on all levels of government, from the local to the international. The most pressing issues experienced are in the realms of roles, responsibilities and financing adaptation efforts. These issues are not unique to Sweden, but are brought up as general challenges in the international arena as well. The processes of addressing some of these challenges have already started, for example, the county board in Skåne set up and facilitates “study circles” with municipalities as a conduit for a more holistic approach to the question of adaptation. Another example is MSB and Gävleborg CABs collaboration on decision-making with uncertain information, specifically about sea-level rise and spatial planning. Yet, it is still within the confines of the regulation, legislation, praxis and strategy that has been staked out, one of technical solutions, individual responsibilities for land management, overlapping responsibilities and lack of collaboration avenues, in short still fragmented.

Roles and responsibilities in the climate adaptation work are relatively clear from a judicial standpoint, but some of which contribute to further fragmentation in the overall governance of climate adaptation. Interviewees highlighted the problems both of how to understand the distribution of responsibilities, as well as guidance on how to interpret the key pieces of legislation. There are also some questions that are yet to be addressed, especially that of the already built environment, which currently must be protected by individual property owner, an extremely complex issue to cope with. Moreover, because of the decentralized nature of Sweden’s governance system, organizational structures may create confusion, and barriers for cooperation to more holistic climate adaptation.

These puzzling responsibilities are made even more critical through the confusing financial obligations connected to this field. The financing of adaptation efforts is *ad hoc*, with no streamlined processes through which the key actor (i.e. municipalities) can access funding for climate adaptation efforts. There are a few avenues through which they can apply for funding through complicated application processes, all of which require significant time investment from municipal workers making it difficult and inaccessible to smaller municipalities that suffer no less impact of climate change. The largest of these “grants” comes from MSB, which last year paid out SEK235m in total, to technical projects in 15 of Sweden’s 290 municipalities. The bulk of this funding was paid out to three different projects, a pumping station in Kristianstad, a flooding barrier in Mölnådal and a flooding barrier in Vellinge. Furthermore, without the legal right to impose a tax or a charge to cover costs for climate adaptation, municipalities are hamstrung and cannot work with climate adaptation to the extent that many feel the need to.

Connecting the problematic and fragmented areas of responsibilities and financing of climate adaptation shows signs of leading to maladaptive practices in the long-run. The way in which the financing scheme is set up, or not set up, not only favors technical “hard” solutions, but practically makes them a synonym or the only option for climate adaptation action. Even SMHI, the state agency which is tasked with developing methods, and educating Sweden’s public administration about climate adaptation, is a primarily technical organization that works mainly with models and measurements. This way of dividing tasks puts more emphasis on incremental and technical solutions, which recent literature on transformative change shows can lead to a fragmented picture of how to cope with the effects of climate change. Practitioners who work in this system are the ones that knows it best, and also the ones that see and can identify the problems. If they experience the system as ineffective or fragmented, they will work around it lacking the means to influence or change it, as is the case in Sweden today. As was repeatedly outlined in the interviews, it is

more about knowing the right person to turn to, not about going through the proper channels.

The data and information on which this paper is based was collected just before a change in government in Sweden with the late 2022 elections. One of the first acts of the new government was to discontinue the environmental department, and instead incorporate it under the ministry of business and industry. An action that was heavily criticized by those working with environmental questions. Yet, through this vocal criticism, the government maintains that such change and folding environmental and climate issues under the business and industry agenda will lead to more efficiency and an increased focus on climate questions. This remains to be seen as this paper highlighted that structural issues are the root cause to Sweden's fragmented approach to adaptation. It is not yet clear how the government's new direction would influence or change that.

The findings in this paper speak to the importance of a holistic approach to climate adaptation to avoid potential maladaptive approaches. For Sweden, the findings from the interviews connected to previous literature indicate that the system in which they work is fragile and fragmented, which may inhibit any adaptation efforts no matter how much funds are dedicated. Without clear roles, responsibilities and financing solutions within this arena, practitioners will keep running into the same obstacles as their predecessors, and adaptation will stay fragmented and inefficient at best, and maladaptive at worst.

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