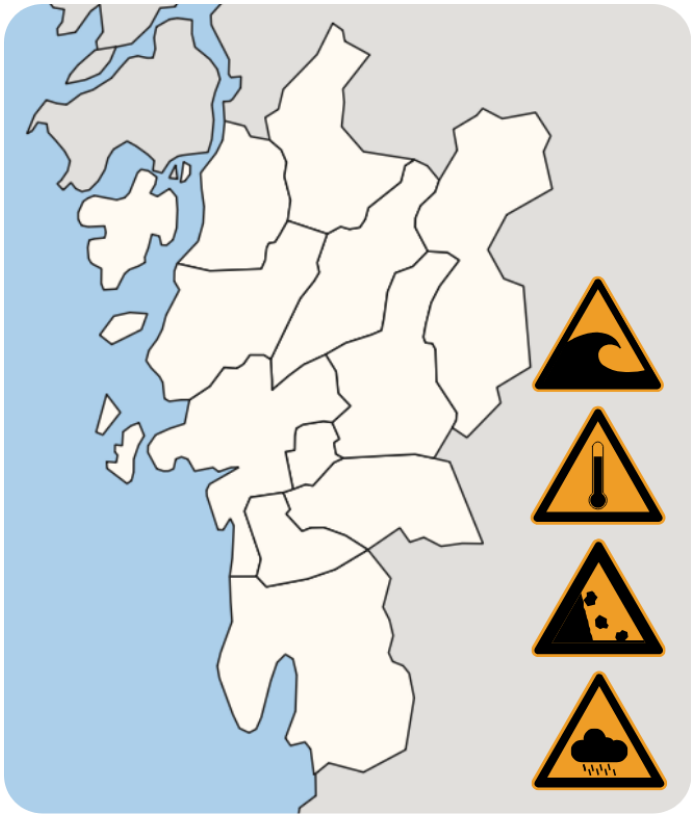

Mapping the Need for Inter-Municipal Climate Adaptation

Barriers and Enablers in the Gothenburg Metropolitan Area

Master's thesis in Industrial Ecology

Alice Carlsson & Lisa Hellström

DEPARTMENT OF ARCHITECTURE AND CIVIL ENGINEERING

CHALMERS UNIVERSITY OF TECHNOLOGY
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ALICE CARLSSON & LISA HELLSTRÖM

Supervisor: Sebastien Rauch, Professor, Water Environment Technology, Architecture and Civil Engineering
Examiner: Mia Bondelind, Associate Professor, Water Environment Technology, Architecture and Civil Engineering

Master's Thesis 2026
Department of Architecture and Civil Engineering
Chalmers University of Technology
SE-412 96 Gothenburg
Telephone +46 31 772 1000

Cover: Map of municipalities in Göteborgsregionen illustrated with environmental risks. Authors' own picture based on data from Statistics Sweden (2026) modified in Canva.com.

Abstract

Climate change is increasingly affecting our societies. Sea level is rising, heatwaves are becoming more frequent and precipitation more intense. These are just some of the events our societies have to manage, making climate adaptation an essential area of work. Municipalities play an important role in this process, and since climate-related events do not follow administrative boundaries, climate adaptation efforts could benefit from inter-municipal collaboration. This study investigates municipalities' perceived need of inter-municipal collaboration in situations in order to achieve effective measures. It also identifies barriers and enablers related both to such collaboration and to the municipalities' internal climate adaptation work. The findings of the study may contribute to the initiation and development of inter-municipal collaboration aimed at addressing regional climate adaptation challenges. Empirical data has been collected through semi-structured interviews with officials from nine of the municipalities in the Gothenburg metropolitan area participating in the climate adaptation network run by the municipal association Göteborgsregionen (GR). Interviews with two officials from the County Administrative Board of Västra Götaland and the Delegation for Göta älv were also conducted. Drainage basins that extend across multiple municipalities were identified as the primary context in which there is a perceived need for inter-municipal collaboration. In these areas, a more holistic perspective is required to implement effective measures and to ensure that actions taken upstream do not negatively affect downstream areas. Identified barriers to such collaboration include the absence of established models for this type of cooperation, limited access to expertise such as geotechnical knowledge, and the high costs associated with climate adaptation measures. The complexity of climate change and its impacts also constitutes a challenge, highlighting the need for collaboration involving a broad range of expertise and stakeholders. The municipalities' internal climate adaptation work also affects the perceived need of inter-municipal collaboration and the possibility of it. Several institutional and organizational barriers, as well as political prioritization and the availability of resources, affect the municipalities' internal climate adaptation work. This study proposes that resilience within collaborative structures and the involvement of diverse actors should be considered key factors when designing inter-municipal collaboration.

Keywords: climate adaptation, climate-related hazards, cross-boundary government, inter-municipal collaboration, municipal governance.

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Alice Carlsson and Lisa Hellström, Gothenburg, May 2026

List of Acronyms

Below is the list of acronyms that have been used throughout this thesis listed in alphabetical order:

GR	Göteborgsregionen
IPCC	Intergovernmental Panel on Climate Change
IVL	The Swedish Environmental Research Institute
MCF	The Swedish Civil Defence and Resilience Agency
MSB	The Swedish Civil Contingencies Agency
PBL	Planning and Building Act
SGI	The Swedish Geotechnical Institute
SMHI	The Swedish Meteorological and Hydrological Institute

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1

Introduction

As the climate changes and global temperature rises, society faces several challenges related to the new climate including sea level rise and extreme weather events causing harm to humans, livelihoods, and ecosystems (Hennlock, Sondal, et al., 2025). This underscores the necessity of preparing for and adapting to a changing climate. Climate adaptation is defined by the Swedish Parliament in Regulation (2018:1428) on the climate adaptation work of government agencies as "measures aimed at protecting the environment, human life and health, and property by adapting society to the consequences that a changing climate may entail" [own translation] (§3). Measures can differ significantly depending on the situation and risk addressed (Hennlock, Sondal, et al., 2025).

The Gothenburg metropolitan area in Sweden is no exception. Gothenburg is part of the Västra Götaland County, which has been identified as one of the most vulnerable areas in Sweden when it comes to landslides, erosion and flooding (Länsstyrelsen Västra Götaland, 2022). Due to climate change, the risk of these events increases, which underscores the need for climate adaptation in this geographical area. This study will focus on municipalities that are part of the municipal association Göteborgsregionen (GR) and their work with climate adaptation. Several areas of municipal responsibility are affected by climate change, such as water infrastructure, healthcare, and emergency services, requiring municipalities to work closely with evaluation and long-term planning for the future (SMHI, 2024). Moreover, Swedish legislation requires municipalities to identify and account for how climate change related risks of erosion, landslides, and flooding affect their physical planning, particularly in comprehensive plans. The municipalities are also responsible for environmental protection and nature conservation, as well as issuing building permits, all of which are closely connected to climate adaptation. This makes municipalities an important and legitimate actor when studying climate adaptation and their strategies for addressing climate-related risks.

Several challenges related to climate adaptation are similar across municipalities in Sweden, and measures taken in one municipality can affect others (Hennlock, Karlsson, et al., 2025), which creates opportunity for inter-municipal collaboration. Swedish Expert Council on Climate Adaptation and the Swedish government emphasize that effective climate adaptation requires solutions that cross municipal and geographical boundaries, particularly for issues such as drainage basins where a holistic perspective is needed (Nationella expertrådet för klimatanpassning, 2022; Regeringens skrivelse 2023/24:97). Climate adaptation has also been identified as

a key challenge by municipal politicians in the development of a regional plan for GR and is stated as a matter of common interest (Göteborgsregionen, 2026a). However, a government-initiated report finds no evidence that a lack of inter-municipal collaboration currently hinders adaptation measures, while noting that this may be because more extensive measures requiring such collaboration are not yet being undertaken (SOU 2025:51, 2025). This highlights a need for further research on the role of inter-municipal collaboration in climate adaptation.

For the municipalities in GR, collaboration is actively happening through the climate adaptation network coordinated by GR. The network consists of representatives from 12 of the 13 municipalities within GR and in the network they share experiences, lessons and methods they have gained through their work with climate adaptation (Göteborgsregionen, 2025a). While existing research addresses inter-municipal collaboration and climate adaptation broadly, no studies specifically examine the situations in which effective climate adaptation requires collaboration across municipal boundaries within GR. To address this gap, this study investigates in which situations municipalities perceive a need for inter-municipal collaboration to achieve effective climate adaptation, as well as the factors that influence their ability to do so. To examine this, municipal officials within GR's climate adaptation network were interviewed, as well as two officials from the County Administrative Board of Västra Götaland and the Delegation for Göta älv, and their responses form the basis for the analysis. Finally, key considerations for designing effective future inter-municipal collaborations are presented.

1.1 Aim

The aim of this study is to map the need for collaboration between municipalities within Göteborgsregionen in situations where effective climate adaptation requires coordination across municipal boundaries, and to investigate the barriers to and enablers of such collaboration. The study further aims to identify patterns of perceived collaboration needs and examine which factors should be considered in the design of effective future collaborations for inter-municipal climate adaptation.

1.2 Research Questions

The following research questions will be answered to achieve the aim:

- In which situations do municipalities perceive a need for inter-municipal collaboration for effective climate adaptation?
- What barriers and enablers affect inter-municipal collaboration in these situations?
- What patterns of perceived inter-municipal collaboration needs can be identified?
- What factors should be considered in the design of effective future collaborations for inter-municipal climate adaptation?

1.3 Delimitations

The study, including the interviews, was conducted in the spring of 2026. Consequently, the results will capture the conditions and focus areas in that particular point in time, although both past experiences and future perspectives are discussed. Geographically, the study is restricted to municipalities within GR.

The study is delimited to a qualitative interview approach, focused on municipal officials participating in GR's climate adaptation network, as well as representatives from two relevant governmental agencies. The focus of the study and the interviews is on collaboration between municipalities and not collaboration between singular municipalities and governmental agencies. The selection of respondents is limited to individuals working within public administration, meaning that perspectives from other actors such as politicians, private sector stakeholders, or citizens, are not included. Furthermore, the study is delimited to primarily examine climate adaptation from the perspectives of the interviewed actors. As the study does not include officials with specific responsibility for, for example, water and wastewater or ecological issues, these areas are not treated as central analytical themes and are therefore not explored in depth, even though they might be relevant for climate adaptation.

2
Theory

This chapter presents the theoretical background relevant to the study, aiming to provide a foundation of knowledge for understanding the subsequent chapters. It begins by outlining climate-related hazards faced by society, with a particular focus on those most relevant to municipal climate adaptation work. Relevant stakeholders and their responsibilities are then presented, followed by an exploration of the concept of inter-municipal collaboration. Lastly, the chapter provides a brief review of the current research landscape and identifies existing knowledge gaps.

2.1 Climate-Related Hazards

The global average temperature is increasing, which affects the global climate and our society in several ways (IPCC, 2023). Some of these effects are illustrated in Figure 2.1, as well as the dynamics and interconnections between different risks and hazards.

Higher temperatures lead to increased temperature in the ocean, which causes sea levels to rise and affects marine ecosystems. Rising temperatures also lead to melting of land ice and glaciers, thereby contributing to sea-level rise. Increased sea levels affect coastal ecosystems, increase groundwater salinization and will make flooding at coasts more common, especially during storms, which can damage infrastructure. Higher temperatures also cause sea ice to melt and decrease the snow cover, which will cause a loss of biodiversity. In addition, higher temperatures cause an increase in evapotranspiration, which can lead to more intense and frequent heavy precipitation and cloudbursts, potentially causing flooding. Heavy precipitation can also lead to more erosion, which in turn can lead to more landslides (Statens geotekniska institut, 2025b). The risk of landslides can also increase due to the increase in heavy precipitation and cloudbursts, and due to the changes in temperature since it weakens the soil structure (Gariano and Guzzetti, 2016). The increased evapotranspiration will also reduce the amount of surface water, affecting the access of drinking water, and in combination with more frequent warm periods and heatwaves due to rising global average temperatures, droughts will become more common (IPCC, 2023). Droughts, longer periods of warm temperatures and heatwaves pose risks to human health, ecosystems, losses of species, and food production.

The increased evapotranspiration results in more water vapor in the air, which contributes to additional warming (Goosse et al., 2018). The melting of ice and

snow decrease the amount of surface area with a high albedo, which results in more absorption of radiation and therefore more warming. These are two examples of how increases in global average temperatures can lead to further warming through positive feedback loops.

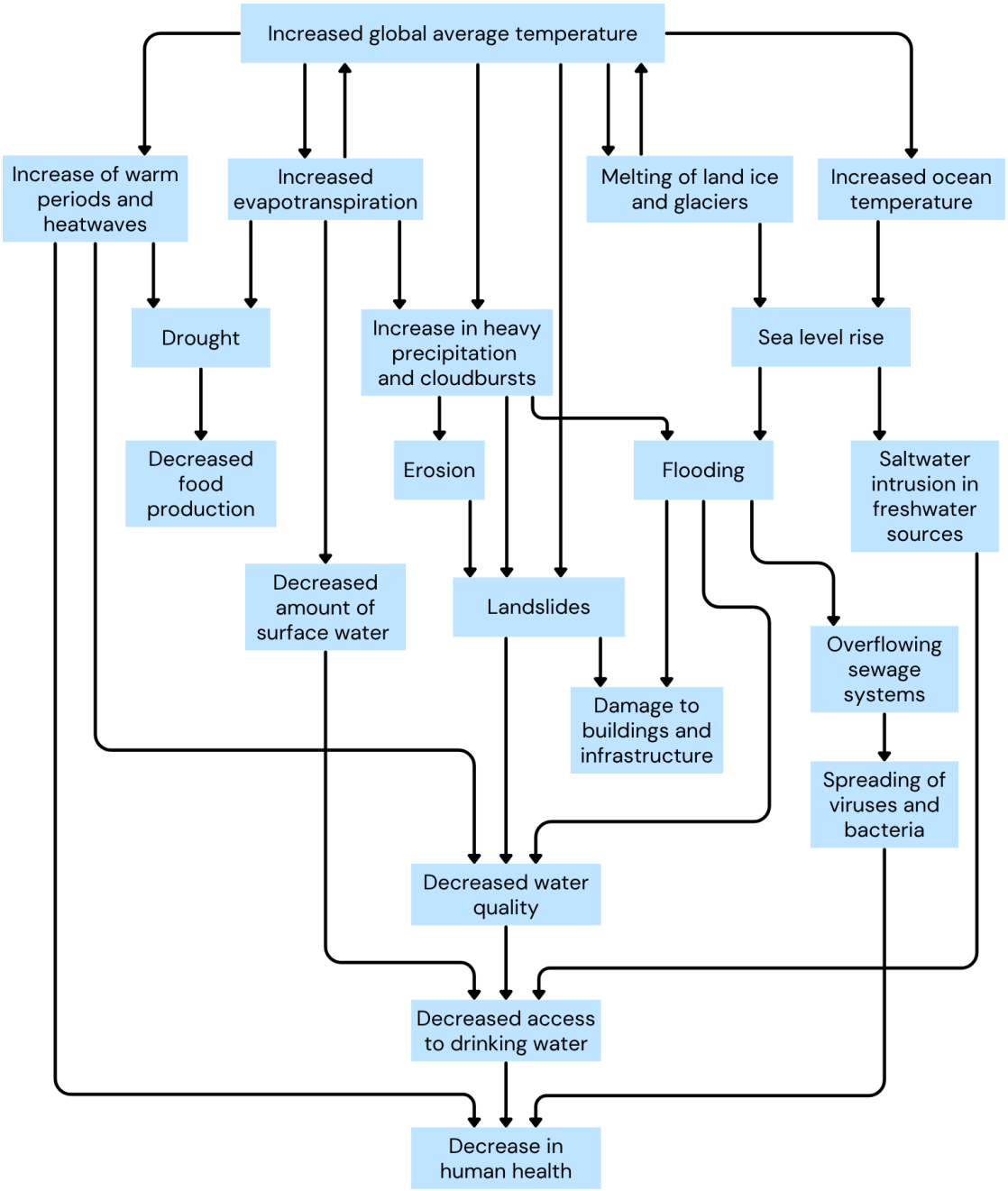

Figure 2.1: System map of some of the effects of increased global average temperature to show the dynamics and interconnections between different hazards and risks. Authors own figure based on information from IPCC (2023), Statens geotekniska institut (2025b), Gariano and Guzzetti (2016), Goosse et al. (2018), Myndigheten för samhällsskydd och beredskap (2022a) and Naturvårdsverket (2024).

In this thesis a climate-related hazard is defined based on the definition stated by the County Administrative Board of Västra Götaland, "A climate-related hazard is defined as a potential natural or anthropogenic physical event, trend, or impact that may cause death, injury, or other health effects, as well as loss of or damage to property, infrastructure, livelihoods, service provision, ecosystems, and natural resources." [own translation] (Georgieva Lagell and Tofeldt, 2024, p.13). The effects outlined above are just some of the climate-related hazards and risks that global warming will lead to. IPCC (2023) states in their report that "Climate-related risks to health, livelihoods, food security, water supply, human security, and economic growth are projected to increase with global warming of 1.5°C." (p.71). They also write that the more the global warming increases, the more severe these risks will become. The consequences for society and nature will also depend on the socio-economic development and adaptation measures taken in the future.

The hazards are interconnected, where the combination of hazards can lead to more severe consequences, or one hazards can trigger another, as described above (IPCC, 2023). The hazards can cause further effects across several sectors and affect human life in different ways. In the report, IPCC gives an example where extreme heat and drought lead to decreased food yield and losses in food quality, and reduce people's work capacity, which affect households income. This leads to increased food prices and affects food security negatively. All of this in turn leads to a decrease in the quality of people's lives. This example illustrates the complexity of the climate change issue and the interdependence of various parts of society and natural systems, which contributes to these system dynamics.

This complexity operates on a global scale but has local effects. The Swedish Meteorological and Hydrological Institute (SMHI) lists climate-related events and explain how these affect Sweden (Myndighetsnätverket för klimatanpassning, 2025). The list is compiled into Table 2.1 and a short explanation of each event is also included.

Table 2.1: Climate-related events, table based on information from SMHI (Myndighetsnätverket för klimatanpassning, 2025).

Event	**Explanation**
Fire	Forests and land fires. The period where there is risk for fire will begin earlier and become longer, especially in southern Sweden.
Heatwave	Periods with high temperature will become more common and longer. Affect human health, especially people in risk groups, and may lead to deaths. It also affect societal functions such as energy supply and food storage.
Drought	Affect ecosystems, agriculture, forestry, industries, hydropower plants and, the access to and quality of drinking water.

Event	Explanation
Changed precipitation patterns	Increased precipitation can lead to flooding, damage on infrastructure and affect agriculture. Extremes in precipitation will also become more common and intense. Precipitation as snow can damage buildings and infrastructure, and affect transportation. The precipitation during winters will increase, however the periods of snow will become shorter and the snow cover will be thinner.
Flooding	Will become more common and can be caused by cloudbursts, sea level rise or increased water flow in watercourses or lakes.
Changed water levels	Changes in the amount and quality of ground water, affecting the availability of drinking water and water for irrigation. Changed water flows in watercourses will affect societal functions, such as power plants and water supply, industries and ecosystems. Changed water level in lakes and the sea affects buildings and societal functions at the coasts.
Erosion	Increased precipitation, water flows and sea level rise can increase the risk of erosion at coasts, watercourses, lakes and land. This can damage buildings and infrastructure, such as roads and railways, and can cause spreading of contamination.
Landslides	Changes in climate, including increased water flows, more intense rainfall, and altered soil moisture conditions, may increase the likelihood of landslides, potentially causing significant damage to land, buildings, and infrastructure.
Debris flows	Rapid flows of water and soil may become more frequent due to changes in precipitation. Debris flows cause erosion and may damage infrastructure.
Algal blooms	More days with algal blooms can affect drinking water quality and ecosystems.
Changes in plant and animal life	Shifts in climate and vegetation zones can impact species and ecosystems and may contribute to the spread of invasive species.
Changed humidity	The amount of water vapor in the atmosphere changes. Both low and high humidity can have negative effect on human health.
Spread of pollutants	Changes in water flows and levels favor the transport of pollutants in soil and water, potentially leading to wider dispersion and impacts on both humans and ecosystems.
Storm	Warmer and wetter winters may increase the risk of storm damage.

Event	Explanation
Changed ice cover	The ice season is becoming shorter with reductions in its geographic extent and average thickness that may affect ecosystems.
Freeze–thaw cycles	The number of times temperatures fluctuate above and below 0°C within a day decreases as average temperatures rise, potentially affecting agricultural conditions.

Looking at the Gothenburg metropolitan area, the region faces significant risks related to erosion, landslides, and flooding (Georgieva Lagell and Tofeldt, 2024). In addition, heatwaves are projected to increase in frequency as a result of climate change. These risks are also commonly highlighted in municipal assessments of climate change impacts (Hennlock, Sondal, et al., 2025), as well as in interviews conducted as part of this study, and will therefore be explored in more detail.

2.1.1 Heat

A heatwave can be defined as "a continuous period during which the day's highest temperature exceeds 25°C for at least five consecutive days" [own translation] (Myndigheten för samhällsskydd och beredskap, 2022b, p.4). In addition to the consequences that have been discussed previously, the spread of diseases, pests, and invasive species is also expected to increase due to more frequent warm periods (Regeringens skrivelse 2023/24:97). Cities will be extra affected by heat since the infrastructure stores heat and can cause urban heat islands. The need for cooling solutions will therefore increase. Rising average temperatures are expected to alter the quality of raw water supplies by increasing the release of dissolved nutrients and organic matter from soils and sediments, which can contribute to more frequent and severe eutrophication events (Naturvårdsverket, 2024).

2.1.2 Flooding

IPCC defines a flood as "The overflowing of the normal confines of a stream or other water body, or the accumulation of water over areas that are not normally submerged" (IPCC, 2021, p.2230). Flooding can happen due to different causes. The most common causes in Sweden are when there is much rainfall or snowmelt causing lakes or other watercourses to flood, flooding at the coast due to high sea level during storms or other weather events, and flooding due to cloudbursts (Myndigheten för samhällsskydd och beredskap, 2022a). Flooding can cause damage to buildings and infrastructure, causing problems such as damaged or blocked roads that affect transportation and emergency services, as well as problems with electricity supply and communication. Industries located close to water can also be affected. Cloudburst and flooding may cause sewage systems to overflow leading to viruses and bacteria spreading (Naturvårdsverket, 2024). The water quality can also decrease due to flooding of contaminated areas and increased runoff from landfills.

2.1.3 Sea Level Rise

The global sea level rise will cause temporal sea level rise during storms and other weather events to be even higher than today, which will lead to higher risk of flooding at coasts (IPCC, 2023). The studied area is located in the southern part of Sweden where the land rise is smaller than the sea level rise, unlike the northern parts where the land rise is larger (Georgieva Lagell and Tofeldt, 2024). The southern part will therefore be more affected by the sea level rise and floodings will be more common in this area.

2.1.4 Cloudburst

Cloudburst is defined by SMHI as “at least 50 mm [of precipitation] in one hour or at least 1 mm in one minute” [own translation] (Olsson et al., 2017, p.7). Cloudbursts can occur anywhere in Sweden but are more common in southwestern Sweden, where the municipalities within GR are located. Statistically determined rainfall amount, intensity, and duration is often used when planning for adaptation to flooding risk (Olsson et al., 2026). It refers to a rainfall event with a magnitude that statistically corresponds to a given return period, such as a 100-year rainfall event. When modeling future scenarios, a climate factor is used to take the increased intensity of short-duration extremes, due to climate change into consideration. This does not however take possible changes in frequency of these events into consideration.

2.1.5 Erosion and Landslides

Erosion is a natural process in which soil or rock is gradually worn away and transported by wind or water (Statens geotekniska institut, 2025b). This process usually occurs slowly, but extreme weather events, such as heavy rainfall or strong winds, can significantly speed it up. In areas with steep slopes, erosion may also contribute to the initiation of landslides.

A landslide is "the movement of a mass of rock, debris, or earth down a slope, under the influence of gravity" (Gariano and Guzzetti, 2016, p.228). Closeness to watercourses, together with the presence of quick clay, also increases the likelihood of landslide activity (Hultén et al., 2005). Due to the glaciomarine conditions in the Gothenburg metropolitan area, the region of this study has a high likelihood of forming quick clay (Statens geotekniska institut, 2025a). Quick clay refers to a soil type whose strength can rapidly deteriorate when disturbed. While it does not initiate landslides on its own, slope failures that occurs in areas containing quick clay may develop over larger areas and result in more severe damage. Landslides can lead to large damage on infrastructure and, if close to water sources, decrease the water quality especially if the soil is contaminated (Naturvårdsverket, 2024).

2.2 Stakeholders

This section will present some of the largest stakeholders working with climate adaptation on national, regional and local levels in Sweden, providing background on their authority and responsibilities. Table 2.2 provides an overview of the stakeholders and their main responsibilities in climate adaptation.

Table 2.2: Overview of key stakeholders in climate adaptation governance in Sweden. (Boverket, 2024; Lundh et al., 2022; Myndigheten för samhällsskydd och beredskap and Statens geotekniska institut, 2021; Nationella expertrådet för klimatanpassning, 2022; SFS 2018:1428; SOU 2025:51)

Stakeholder	**Level**	**Main responsibilities in climate adaptation**
Government	National	Sets the overall framework, legislation, and allocates funding for climate adaptation work.
National governmental agencies (e.g. SMHI, SGI, Boverket, MCF)	National	Provide knowledge, support and risk assessments within their respective areas of responsibility.
County administrative boards	Regional	Coordinate and support regional climate adaptation work, provide guidance to municipalities, and supervise planning processes.
Municipalities	Local	Responsible for physical planning, risk management, and implementation of climate adaptation measures.

2.2.1 The Government

The Government has the overall responsibility of setting the framework for the work with climate adaptation, but the responsibility is quite vague (SOU 2025:51). It is also the government that has the possibility to propose and change laws on the topic and to give financial support to accident prevention work. There is not a specific department for climate adaptation, but each department should take responsibility for climate adaptation within their field and also receive the reports on climate adaptation work performed by the governmental agencies they are responsible for (Nationella expertrådet för klimatanpassning, 2022). The government also decides the tasks of the governmental agencies.

2.2.2 Governmental Agencies

Several governmental agencies in Sweden are legally required to initiate, support, and evaluate climate adaptation efforts within their respective areas of responsibility (SFS 2018:1428). In addition, these agencies collaborate in various constellations on issues related to climate adaptation (Boverket, 2024). Some agencies have also been

assigned more specific tasks within the field of climate adaptation. For example, the Swedish Civil Defence and Resilience Agency (Myndigheten för civilt försvar, MCF) (previous called the Swedish Civil Contingencies Agency (Myndigheten för samhällsskydd och beredskap, MSB)) has the responsibility of working with accident prevention and should lead the work with EU directive on the assessment and management of flood risks. The Swedish Meteorological and Hydrological Institute (SMHI) is responsible to produce and communicate knowledge about climate change that can be used as a basis for climate adaptation within spatial planning. Similarly the Swedish Geotechnical Institute (SGI) should provide municipalities and governmental agencies with geotechnical expertise and support them in planning and building processes. SGI has also been commissioned by the government to identify areas at high risk of geo-hydrological hazards (Myndigheten för samhällsskydd och beredskap and Statens geotekniska institut, 2021). At a more local level, the Delegation for Göta älv, operated by SGI, function as a collaborative forum where the municipalities along the river can apply for funding for landslide prevention measures. The Swedish National Board of Housing, Building and Planning (Boverket) has been assigned by the government to coordinate national climate adaptation efforts concerning the built environment (Boverket, 2024). The agency also provides guidance to municipalities and county administrative boards regarding the implementation and supervision of the Planning and Building Act (PBL).

The county administrative boards (Länsstyrelser) have the responsibility of coordinating and supporting the regional climate adaptation work (SFS 2018:1428). This includes helping municipalities and other regional actors with planning, analyzing climate impacts in their county and adjacent areas, developing tools and information for planning, and engaging with local initiatives. As regulated in PBL, the county administrative boards are also responsible for supervising the municipalities' physical planning (Lundh et al., 2022). This means that they can give opinions on comprehensive plans, and review and overturn municipal decisions about a local plan if they see them unfit from the perspective of health or safety. The county administrative boards are furthermore responsible for processing water operations that require notification in accordance with the provisions of the Swedish Environmental Code (Boverket, 2024).

2.2.3 Municipality

The municipalities have a central role and multiple obligations in the climate adaptation work (Nationella expertrådet för klimatanpassning, 2022). They are responsible for several vital societal functions that are affected by climate change and also the physical planning. The municipalities are, for example, in charge of the public water supply and should manage them with human health and environment in mind (Lundh et al., 2022). They must also work toward preventing natural hazards within their municipal boundaries (Nationella expertrådet för klimatanpassning, 2022). The municipal physical planning is regulated in PBL, which includes for example rules about the comprehensive plan and local plans. Municipalities should include climate related risks to existing buildings in their comprehensive

plans, including flooding, erosion and landslides. The local plans have to protect buildings and infrastructure, and the placement of new buildings have to take the risk of flooding, erosion and accidents into consideration.

Another law that the municipalities are governed by is the Swedish Local Government Act (Kommunallagen, SFS 2017:725) in which both the principle of equal treatment and the principal of local connection are described. The principal of equal treatment entails that in all municipal activities, municipalities must treat their residents equally. Deviations from this principle of equal treatment are permitted only where there are objective and legitimate grounds. The principal of local connection states that municipalities have the right to manage matters of common interest to their residents as long as such matters have a clear connection to the municipality's geographical area or to its members. However, the responsibilities of municipalities are limited. They may not assume tasks that, under the law, are assigned to the state, to other municipalities, or to other actors.

In a project run by GR, the municipalities were asked about their thoughts on municipal responsibility in the climate adaptation work (Göteborgsregionen, 2024). The project showed that several participants are uncertain about their responsibility when it comes to existing structures, especially in relation to property owners. They also raised that the current legislation is defective which sometimes leads to less efficient measures being implemented. Participants further described the legal division of responsibility as unclear and, in some cases, inconsistent.

2.3 Inter-Municipal Collaboration

This section aims to provide background on inter-municipal collaboration, including incentives for municipalities to participate, potential risks, and approaches that may foster collaboration. In addition, key terms related to the topic are defined.

2.3.1 Drivers, Challenges and Risks of Inter-Municipal Collaboration

There are different reasons why municipalities collaborate. Common reasons found in literature include enabling municipalities to maintain or improve the quality and range of services provided to residents, securing necessary skills and expertise, and economical reasons, such as to reduce costs or more efficient use of resources (Erlingsson et al., 2021; Grip and Karlsson, 2026; Statskontoret, 2023). These outcomes are often attributed to large-scale operations (Erlingsson et al., 2021). There are examples of collaborations where costs have been reduced, however there are also examples where the costs have increased, due to for example transaction costs (Erlingsson et al., 2021; Statskontoret, 2023). For some municipalities in Sweden, inter-municipal collaboration can be necessary or serve as an important tool for managing challenges such as demographic changes and urbanization that affect their ability to provide services to citizens (Statskontoret, 2023). The need for collaboration is also

predicted to increase. In Sweden neighboring municipalities are the most common to collaborate with, and municipalities within the region are the second most common (Grip and Karlsson, 2026). Collaboration with comparable municipalities or municipalities in other regions is not as common. School issues, administration, social services, planning and construction, environmental and health protection, technical infrastructure and functions, such as sport facilities and library systems, are common themes for inter-municipal collaboration. However, in which way collaboration occurs differ between the themes.

Some barriers to inter-municipal collaboration discussed in the literature include the financing of the collaboration itself or of related work within the municipalities, unclear purposes or organizational structures, and an unclear distribution of responsibilities within the municipalities (Länsstyrelsen Västra Götaland, 2022). The literature also highlights certain risks associated with inter-municipal collaboration, such as democratic challenges and the potential for more complicated governance and decision-making processes (Erlingsson et al., 2021; Statskontoret, 2023). Since compromises are necessary in collaborations and the operation is not handled only internally in the municipal organization, a municipality's ability to control the operation may be limited within the collaborative arrangement (Statskontoret, 2023). This can limit the municipalities' willingness to collaborate about questions where the politicians want to keep their influence, or limit the questions where collaboration is seen as suitable. There is also a risk that collaborations lead to reduced transparency and a weaker possibility of holding actors accountable. However, Statskontoret also adds that the municipalities can work to limit these risks and Erlingsson et al. (2021) add that there are different results about these risks and that there is a need for more studies on this topic.

2.3.2 Approaches for Supporting Collaboration

Since inter-municipal collaboration may involve unclear responsibilities, compromises between actors, and different forms of governance, approaches that may support collaboration processes are of interest. Collaboration between municipalities can take the form of either a bottom-up, voluntary initiative or a top-down process driven by the state (Erlingsson et al., 2021). To facilitate collaboration, a range of methods and approaches can be applied, such as stakeholder dialogue, co-creation, and knowledge-sharing activities (Brokking et al., 2021). Another approach discussed in literature is backcasting. Van der Voorn et al. (2023) compare how backcasting has been applied in climate adaptation studies. The backcasting process begins with envisioning a desirable future and then comparing this future with the current situation in order to identify and plan the changes needed to achieve that future.

2.3.3 Types of Collaboration

There are several types of collaboration used by Swedish municipalities today (SOU 2020:8). In the Swedish government official report SOU 2020:8, the following forms of collaboration are highlighted: municipal associations, joint committees, contractual collaboration, jointly owned companies, networks, and non-profit associations. There are large differences between these forms of collaboration and they are appropriate in different situations depending on for example the planned duration of the collaboration.

When a municipal association is established by municipalities, it becomes a new legal person that assumes responsibility from the municipalities for the functions decided upon (SOU 2020:8). A municipal association is governed by a board consisting of political representatives from all participating municipalities which jointly make decisions. Critical for municipal associations is to find the balance between democratic processes and effectiveness. Collaboration through municipal associations is suitable when there are many municipalities taking part in the collaboration, since it facilitates decision making (Statskontoret, 2023). It is also suitable for collaborations that need specialization or specific expertise, and it enables a more holistic perspective on the needs of a larger area than the individual municipalities. However, there is a risk that the associations become too independent and this form of collaboration is not suitable for questions where the politicians want to maintain strong influence. The municipal association Göteborgsregionen (GR) is an example of this type of collaboration. It consists of 13 municipalities in the Gothenburg metropolitan area and has public authority assignments, do research, projects and education, among other things (Göteborgsregionen, 2026b). They work with questions within areas such as the job market, climate and environment, built environment, and education (Göteborgsregionen, 2025c).

Another form of collaboration used by municipalities is joint committees (SOU 2020:8). In contrast to municipal associations, joint committees are not legal persons, and responsibility for the functions in which the committee operates remains with each municipality. A municipality's control of the operation and the possibility of holding actors accountable is therefore higher in this form of collaboration than in municipal associations (Statskontoret, 2023). The committee is placed within the organizational structure of one of the municipalities but includes members from all participating municipalities (SOU 2020:8). This form of collaboration is mainly used for administrative purposes. It is less suitable for collaboration involving many municipalities, since governance and delegation decisions must first be processed by each individual municipality (Statskontoret, 2023).

Another collaborative arrangement is contractual collaboration through which a municipality can transfer specific tasks to another municipality (SOU 2020:8). Contractual collaboration may, for example, involve the investigation and decision-making of various cases, which would otherwise typically be delegated to officials within the municipality itself. Generally, responsibility for these tasks remains with the transferring municipality, but there are exceptions. Contractual collaboration is rel-

atively easy to initiate and can therefore enable collaboration in situations where other forms are more difficult to establish (Statskontoret, 2023). It is not a suitable form of collaboration in questions where politicians want to maintain strong influence, since the possibility to control the operation is more limited.

Jointly owned companies are companies owned by municipalities and which take over the management of a municipal function (SOU 2020:8). The company is often a legal person and if the company is fully owned by municipalities all the board members are assigned by the municipal councils. Jointly owned companies are most common in the form of real estate companies and companies operating in the energy and environmental sectors. There are also types of collaborations which can be described as less formal. Networks and non-profit organizations are examples of these types of collaboration. These are efficient for joint learning and exchanging experiences. An example of a network is the climate adaptation network, coordinated by GR but initiated by the participating municipalities (Göteborgsregionen, 2025a). Within this network they share experiences in order to create collective learning and develop a shared understanding of climate adaptation.

2.3.4 Defining Collaboration

Collaboration is used in many ways and have several near-synonyms (Castañer and Oliveira, 2020). The concepts of coordination, cooperation and collaboration have many definitions that do not always align. In this study, the terms will be used as follows. Coordination can be understood as a process through which actors align or adjust their actions and decisions in relation to one another in order to avoid conflicts, inefficiencies, or negative externalities, without necessarily working together directly or sharing responsibilities. Cooperation refers to situations where actors share knowledge or resources to help each other fulfill their own goals. Finally, collaboration refers to situations where actors work together toward a common goal and engage in joint decision-making.

2.4 Present Research and Knowledge Gap

This section provides an overview of the existing literature on inter-municipal collaboration in relation to climate adaptation and identifies the potential contribution of this study.

Several studies have assessed climate-related risks in Sweden. A national study by MSB and SGI identifies areas at risk of landslides, erosion, and flooding, highlighting high risks in Västra Götaland and the municipalities within GR (Georgieva Lagell and Tofeldt, 2024). At the regional level, the County Administrative Board of Västra Götaland conducted a climate and vulnerability assessment in 2024 that further evaluates these risks and shows which areas are more urgent for the municipalities to work with.

Some studies on inter-municipal collaboration were also identified during the course

of this study (see, for example, Statskontoret, 2023; Erlingsson et al., 2021; Erlingsson and Folkesson, 2022). They have investigated the benefits and purposes, challenges and risks, and barriers to inter-municipal collaboration, but not with a focus on climate adaptation. The County Administrative Board of Västra Götaland has published a report on inter-municipal collaboration in climate adaptation (Länsstyrelsen Västra Götaland, 2022), in which they examine the characteristics of networks that have made greater progress in their work, as well as the barriers and benefits of such collaboration, and factors facilitating effective collaboration. On a more local level there are studies that have been conducted on the municipalities within GR. One example is a study done by Björling and Fredriksson (2023) in which they use two inter-municipal projects involving GR to examine opportunities and obstacles for developing inter-municipal planning. One focused on transport and commuting, and one focused on coastal planning. Both aim to support regional development. The study concluded that inter-municipal planning is both necessary and feasible, but requires stronger collaboration frameworks, sufficient resources, and better mechanisms to manage conflicts and ensure long-term implementation. Other examples of more local studies are Kristianssen and Granberg's (2021) article on how the municipalities work internally with climate adaptation and the study made by Lundqvist (2015), describing how the internal and external work with climate adaptation is described in the comprehensive plans.

Incorporating climate adaptation across a wider range of domains has also been addressed in previous studies, but these studies have not focused on inter-municipal collaboration in this context. Roggema et al. (2012) describe in their article a potential framework for how climate adaptation can be incorporated into spatial planning. They also explain how climate change is a wicked issue which collides with the traditional way of working with spatial planning and how properties of a complex adaptive system can relate to important parts of spatial planning such as adaptive capacity. The article by Uittenbroek et al. (2013) discusses how climate adaptation can be integrated into other policy areas, known as mainstreaming, in order to ensure long-term sustainability and reduce vulnerability to climate change. It emphasizes the importance of understanding connections between different sectors, for example between climate and health, and that this knowledge needs to be communicated both to planners and to society at large. The article also presents a way to analyze how well climate adaptation is integrated in different contexts and identifies several types of barriers to mainstreaming climate adaptation.

The Swedish Climate Adaptation Inquiry, presented in the report Better Conditions for Climate Adaptation (SOU 2025:51), examines the current legal and financial conditions for implementing effective climate adaptation measures. It proposes several amendments to existing legislation that could make it easier to implement measures. The report also introduces a model for cost-sharing between municipalities and property owners, and suggests an expanded state responsibility for some coastal flood protection. At the time of writing, the report has completed the consultation phase, and it remains to be seen whether the proposals will result in a government bill being submitted to Parliament. The Swedish Environmental Research Institute (IVL) and

Insurance Sweden have for several years performed an investigation about Swedish municipalities' strategic climate adaptation work, where they rank the municipalities' climate adaptation work and compare the results to previous years (Hennlock, Sondal, et al., 2025). This is to show how far different municipalities have come and which challenges there still are. According to the report there are large differences in ranking between the municipalities within GR.

A case study considered relevant for this thesis is that of Vitale and Meijerink (2021). The authors examine how conflict and cooperation between municipalities have shaped flood risk management in the Seveso River Basin near Milan. The study illustrates how interdependence between upstream and downstream municipalities can generate both cooperation and conflict in managing flood risks. Increasing flood events have led authorities to frame the issue as urgent, enabling more centralized and technocratic decision-making dominated by regional actors and the city of Milan. While this approach facilitated rapid policy formulation, it also limited stakeholder participation and contributed to resistance from upstream municipalities and local communities. The study highlights that power dynamics and a silo mentality played a key role in shaping the outcomes. Overall, the authors argue that more inclusive governance and better integration of diverse perspectives are necessary to reduce conflict and improve the implementation of flood risk policies. Although climate adaptation is not explicitly addressed, climate change is acknowledged as a driver for shifting towards a more risk-based approach. This article will be used in this thesis to inform the discussion on key considerations for future cooperation.

Different actors express the importance of working with climate adaptation and the need for inter-municipal collaboration on this topic. There are, as here have been presented, different types of studies and reports about climate adaptation and inter-municipal collaboration. However, based on the literature review, none specifically focus on situations where effective climate adaptation requires inter-municipal collaboration within the municipalities of GR. This study therefore contributes to the research field by addressing this gap, as well as enabling development in the field of inter-municipal climate adaptation collaboration through the identification of barriers and enablers.

3
Method

This chapter describes how the study was conducted. Data were collected through an interview study and a literature review, and then analyzed to answer the research questions (see Section 1.2). Using interviews enabled the gathering of publicly undocumented information and provided first-hand perspectives. Since this study focused on the current situation this approach also enabled collection of up-to-date data.

The climate adaptation network was identified through contact with GR. The network consist of municipal officials from 12 of the 13 municipalities within GR. Inter-municipal collaboration is currently taking place within the network and when attending a meeting, municipalities expressed a potential for further collaboration. Based on this, the municipalities in the network, and their internal and inter-municipal climate adaptation work were selected as the case study. Interviews with municipal officials participating in the network and working with climate adaptation were selected as the data collection method, as their knowledge and experience were considered central to assessing the need for further inter-municipal collaboration. In addition, interviews with officials from the County Administrative Board of Västra Götaland and the Delegation of Göta älv were conducted. The decision to expand the interview study with these two stakeholders was made since they were brought up in the municipal interviews multiple times as regional actors effecting municipal work and inter-municipal collaboration on climate adaptation.

The project began by reviewing existing literature to gather information on municipalities' challenges and current climate adaptation work. Semi-structured interviews were then conducted with municipal officials via the collaboration platform Microsoft Teams. The results of the interviews were then analyzed using the framework method to generate answers to the research questions. Three network meetings were attended during the course of the study. Although no information from these meetings was used directly in the report, the meetings deepened the researchers' understanding of the context and informed the development of the interview guide.

3.1 Case Study Description

In order to provide contextual understanding for the analysis, this section describes the geographical, climatic, demographic, and institutional characteristics of the study area. The 13 municipalities constituting the municipal association GR, is lo-

cated in southwestern Sweden (Figure 3.1) and had a total population of 1,087,605 in 2024 (Göteborgsregionen, 2025b). The population distribution within the region is uneven, with one municipality accounting for a majority share of the total population, while several others represent significantly smaller proportions. A larger population can provide greater revenue through taxation, but it also entails increased responsibility to meet the needs of more residents. In addition to demographic differences, municipalities within the region are subject to different administrative structures. While most municipalities in GR fall under the County Administrative Board of Västra Götaland, which includes 49 municipalities in total, one municipality is governed by the County Administrative Board of Halland, which includes six municipalities, reflecting institutional variation within the region (Statistics Sweden (SCB), n.d.). For comparison, the median number of municipalities per county administrative board in Sweden is 12.

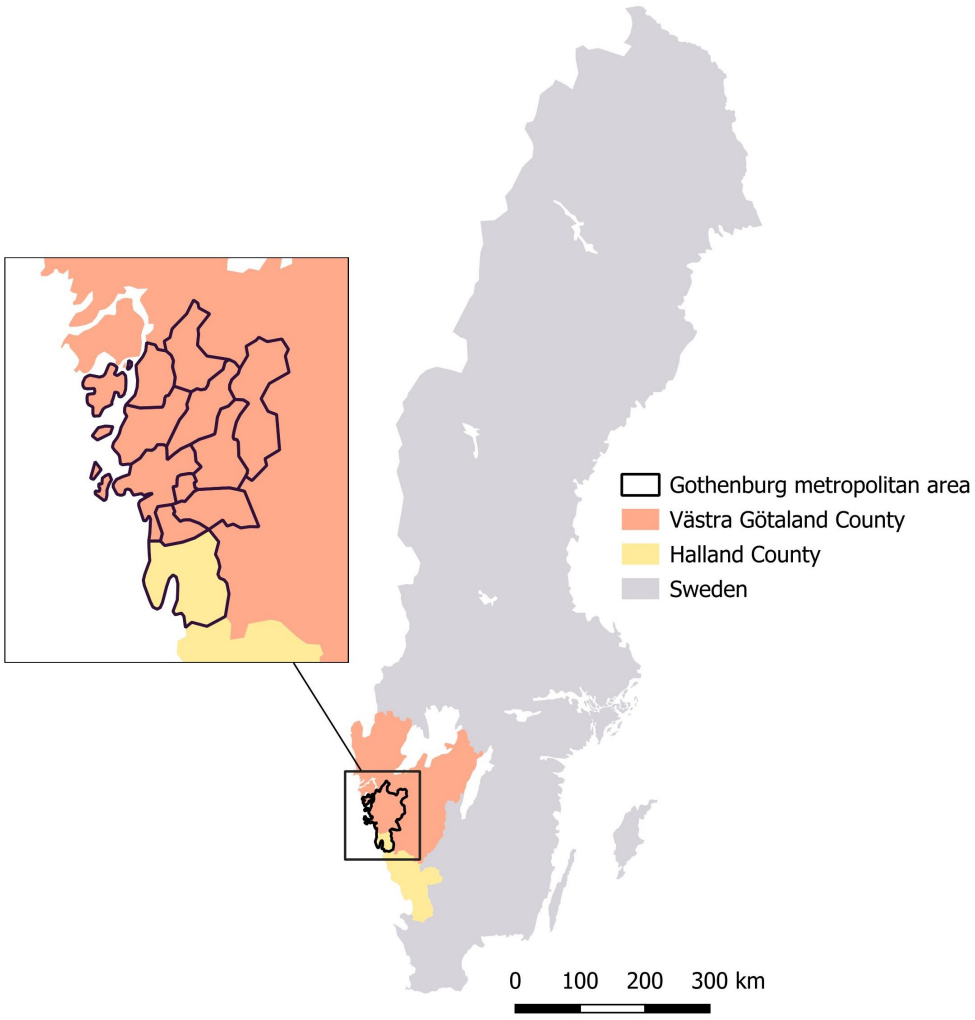

Figure 3.1: Map of the municipalities in GR, the County Administrative Boards of Västra Götaland and Halland, and their location in Sweden. Based on data from Statistics Sweden (2026), modified in QGIS.

The Gothenburg metropolitan area is rich in water (Figure 3.2), as it includes several watercourses such as Göta älv, Säveån, Mölndalsån, and Kungsbackaån, and is also a coastal area (Statistics Sweden, 2026). Ten of the 13 municipalities in GR are in direct contact with at least one of these watercourses and six boarders the sea, of which two municipalities completely existing of islands. The coastal location of the region contributes to relatively stable temperature conditions throughout the year (Bark, 2025). The nearby sea decreases seasonal extremes, resulting in cooler summers and comparatively mild winters. This climatic stability also lead to limited seasonal variation in precipitation patterns.

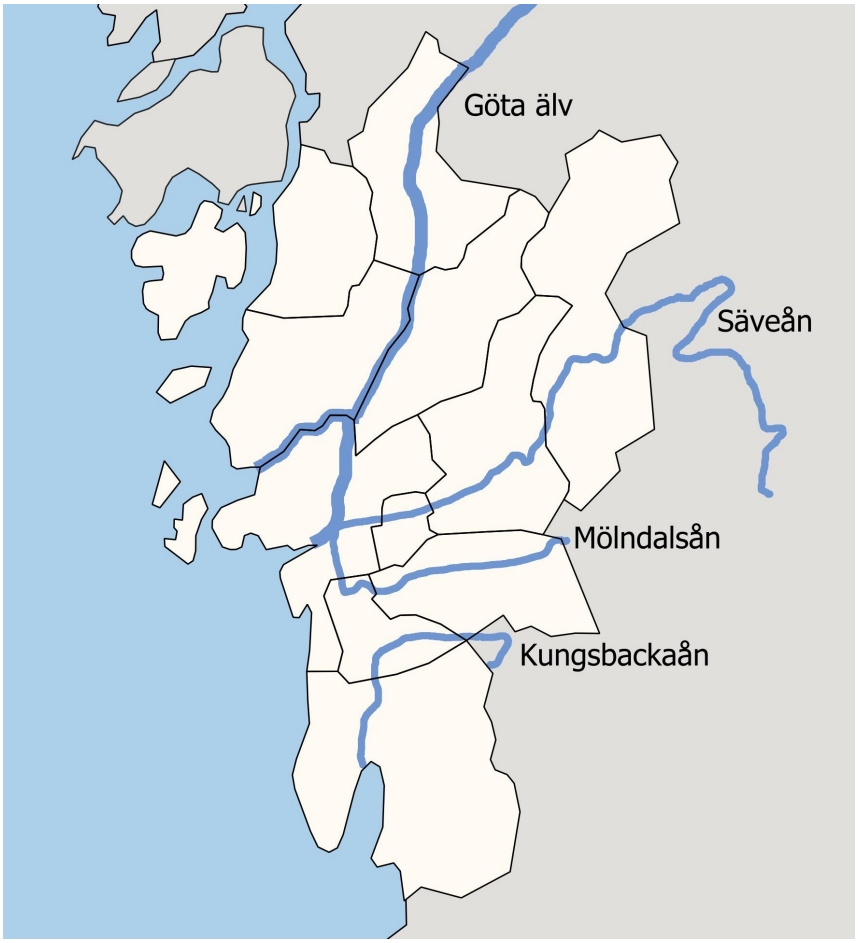

Figure 3.2: Illustration of four watercourses in GR relevant to this study, not to scale. Some of the water courses start in municipalities outside of GR, before they flow through several municipalities within GR, and then either flow into Göta älv or the sea. Based on data from Statistics Sweden (2026), Länsstyrelserna (2022), modified in QGIS.

3.2 Literature Review

A literature review was conducted to provide contextual background and an overview of current research within the field. The review was exploratory in nature and aimed to establish a broader understanding of the research area, identify research gaps, and support and guide the design of the interview method. As such, it served as a foundation for and complement to the empirical data collection rather than as a standalone systematic review.

The review followed an iterative search process, in which literature was continuously identified, assessed, and refined as the understanding of the topic developed. Peer reviewed sources were identified using the databases Scopus and Google Scholar. Searches were based on combinations of the keywords “climate adaptation”, "inter-municipal” and "collaboration", along with related terms. Sources were selected based on their relevance to climate adaptation at the municipal level and their contribution to the analytical focus of the study. Given the local focus of the study, documents produced by municipalities, governmental agencies, and GR were also included. Accordingly, gray literature such as reports and web based publications were used to complement the academic literature. These sources were primarily identified through Google searches and were selected based on their relevance, credibility, and connection to the study context. In addition, a snowballing approach was used, where relevant documents and references within identified sources were followed to locate further material. The majority of the literature used was published in 2021 or later, due to the rapid development of this field.

3.3 Semi-Structured Interviews

The interviews were semi-structured, as this allows for questions that are prepared in advance and questions thought about during the interview (Adams, 2015). An interview guide was made prior to the interviews, containing a set of prepared questions arranged in sequence. Information on each municipality’s climate adaptation work was reviewed prior to the interviews to understand local risks and conditions and to develop the municipality-specific interview guides. The information was obtained from municipal websites and primarily consisted of comprehensive plans and, where available, climate adaptation plans. Depending on, for example, the challenges municipalities face or how far they have come in their climate adaptation work, there were some differences in the questions asked. New topics than the ones expected by the interviewers did also sometimes appear, causing a change in direction of the interview, which is allowed in semi-structured interviews (Adams, 2015). The baseline version of the interview guide used for municipal interviews is presented in Appendix A. When contacted regarding participation in the interviews, all interviewees were informed about the aim of the study and offered the opportunity to request additional information about the study and interviews in advance. One interviewee requested to view the interview guide prior to the interview, which was provided. The interviewers learned more about the topic during the interviews

and the questions for the following interviews were in some cases changed, which the semi-structured approach permits. A few questions with quantitative answers were asked in order to enable comparison between the current situations between the municipalities.

Officials from each of the twelve municipalities participating in the GR network for climate adaptation were contacted via email. Officials from nine municipalities agreed to participate, and in addition one provided a written response instead. The interviewed officials have varying employments and work with climate adaptation to different extents. For example, some work strategically and exclusively with climate adaptation, whereas others work as physical planners and therefore only have climate adaptation as one aspect of their responsibilities. Two additional interviews with officials from the County Administrative Board of Västra Götaland and the Delegation for Göta älv were conducted. Interview guides for these interviews are presented in Appendix B and Appendix C, respectively. The interviews with participants were conducted via Microsoft Teams. Each interview lasted approximately 45 to 60 minutes and was recorded to enable transcription and further analysis. The interviews were conducted in February and March 2026 and where held in Swedish.

3.4 Analysis of Interviews

A framework analysis was performed to analyze the interview results in a structured way. The framework method is commonly used together with semi-structured interviews and was chosen because it allows deep exploration of main themes without losing the individual perspective of the municipalities (Gale et al., 2013). By using the framework method it was also possible to examine similarities and differences between the interview results to be able to draw conclusions and generate themes which was needed to answer the research questions.

The framework analysis was conducted through the following steps:

1. Transcription
2. Coding and development of an analytical framework
3. Insert data into the framework matrix
4. Interpreting the data to draw conclusions

Transcription

The interviews were recorded, with the consent of the interviewees, and transcribed using Microsoft's transcription tool. The transcription was then reviewed and edited by the authors. The interviews were transcribed using a cleaned verbatim approach, with filler sounds excluded. Transcribing an interview enables a thorough analysis. However, since the focus of the interview was not to perform a conversation analysis, filler sounds and pauses were not necessary to transcribe.

Coding development of an analytical framework

Coding was used when reviewing the transcript to sort and classify the data gathered. For the coding process the qualitative data analysis software Taguette (Rampin et al., 2021) was used to mark segments of the transcript with different codes. The initial set of codes was derived from the research questions and the interview guides, with further codes added inductively as recurring themes emerged in the interviews. Table 3.1 presents the complete list of codes used for the interviews with municipal officials and what they incorporated. The codes constituted the analytical framework used in the analysis. For the interviews with the officials from the County Administrative Board of Västra Götaland and the Delegation for Göta älv the codes were adjusted since the role of these governmental agencies differ from the municipalities' and the codes had to capture these differences.

Table 3.1: Codes used in the analysis of the interviews with municipal officials and a description of what they incorporated.

Code	Description
Areas at risk	Geographical areas identified as particularly exposed to risk.
Barriers, specific situations	Barriers linked to specific situations identified as requiring inter-municipal collaboration.
Barriers, general work	Barriers to inter-municipal collaboration or internal municipal climate adaptation work in general, not limited to specific situations.
Enablers	Conditions or actions that facilitate collaboration.
Hazards in focus	Climate-related hazards currently addressed by the municipality.
Internal	Internal municipal organization and the role of the interviewee.
Investigate further	Topics identified as relevant for further investigation or discussion that do not fit under other codes.
Measures	Measures planned or implemented by the municipality.
Ongoing collaboration	Existing coordination, cooperation or collaboration that the municipality is part of.
Other actors	Statements regarding stakeholders other than municipalities.
Politics	The role and influence of local politics in climate adaptation work.
Possible future regional collaboration	Actions that municipalities or other stakeholders could take to develop or enable future collaboration, or topics for which future collaboration may be needed or beneficial.

Code	Description
Specific challenge	Situations in which inter-municipal collaboration is perceived as necessary to achieve effective climate adaptation measures.

Insert data into the framework matrix

Data from each municipal interview transcript were summarized using the analytical framework and displayed in the form of a matrix where each row corresponded to an interviewee. The data from the County Administrative Board and the Delegation were summarized in separate matrices using the adjusted analytical frameworks for these interviews.

Interpreting the data to draw conclusions

The matrix was then used to compile the interview results, with a focus on topics raised by multiple interviewees and relevant to the research questions. The results from the municipalities were also compared with and complemented by findings from the interviews with the County Administrative Board and the Delegation. The results were also analyzed to identify patterns in the responses that could be associated with the municipalities' current conditions and prerequisites. Due to the limited number of municipalities interviewed (n = 9), statistical analysis was not considered appropriate. Instead, the municipalities were analyzed in relation to factors reflecting these conditions and prerequisites, including municipal demographics, the extent of progress in climate adaptation work, geographical characteristics and economic capacity. These factors were used as an analytical lens to structure the data and enable systematic comparison between municipalities with differing conditions and prerequisites in order to identify similarities and differences in experiences and perspectives.

The extent of the municipalities' progress was based on rankings from an assessment of Swedish municipalities' strategic climate adaptation work conducted in 2025 by the Swedish Environmental Research Institute (IVL) and Insurance Sweden (Hennlock, Karlsson, et al., 2025). For municipalities that did not participate in the 2025 assessment, results from previous years were used, as these were deemed comparable (Hennlock et al., 2023; Matschke Ekholm et al., 2021). Since the ranking is based on the municipalities' self-assessment, it was compared with the interview results regarding whether the municipalities have a climate adaptation plan, whether measures have been successfully implemented, and whether there is a designated responsibility for climate adaptation. It was concluded that our interview results supported the ranking done by IVL and a categorization was therefore done based on the ranking.

The geographical characteristics used in the analysis included whether the municipality is connected to any of the four major watercourses, whether it has a coastal

location, and whether its municipal boundary crosses urban areas. Multiple attributes could apply to a single municipality, and in some cases, combinations of these characteristics were treated as distinct analytical categories. Tax base and tax revenue per capita for 2025 were used as indicators of municipal economic capacity. Data for these indicators, along with demographic data, were obtained from Statistics Sweden (Statistics Sweden (SCB), 2025, 2026).

3.5 Use of AI

Artificial intelligence (AI) tools were used in this study as supportive instruments for particular tasks within the research process. The transcription tool within Microsoft Teams, which was used for this study, uses AI for voice-to-text conversion and speaker identification (Microsoft, 2026). Occasionally, AI-based document analysis tools were used to more efficiently identify relevant sections within large documents. AI assistants were used to a limited extent for minor grammatical support. All AI-generated outputs were reviewed and verified by the authors, and no AI tools were used for independent analysis or decision-making within the study.

4
Results

In this section the results from the interviews will be presented and compared. An overarching baseline analysis is first presented, focusing on the hazards prioritized by municipalities, as well as existing conditions that may enable the future expansion of municipalities' climate adaptation work. Then situations in which the municipalities perceive a need for inter-municipal collaboration will be presented, as well as barriers for achieving these collaborations. In the interviews, barriers related to climate adaptation work beyond specific situations were also identified. These, concerning both inter-municipal collaboration and internal climate adaptation work within the municipalities, are presented in the final section.

Since the interviews were conducted with one or two municipal officials from each municipality, the results only represent their answers, which reflect their perspectives and experiences gained when working with this topic. The answers may therefore not reflect a municipality's overall perspective or its political stand in the questions. In the presentation of the results and in the following discussion session it is written for example "one municipality said", by this it is meant that it was said by the interviewed municipal official from this municipality, not that it is the municipality's political stand point. The same is true for the interviews with the County Administrative Board of Västra Götaland and the Delegation for Göta älv. Given the semi-structured nature of the interviews and the varying roles of the interviewed municipal officials, the topics discussed and the focus of the interviews varied between participants. The number of municipalities that addressed each statement will be presented. However, this should not be interpreted as implying that the remaining municipalities disagree with the statement or do not regard it as important. It should also be noted that when making comparisons, classifications such as municipalities with "lower" or "higher" population are relative to the sample in this study and do not refer to national or regional averages.

4.1 Climate-Related Hazards in Focus and Existing Enablers

As described in Section 2.1, there are many hazards related to climate change and it is therefore of interest to examine municipalities' focus in addressing these hazards. Regarding climate-related hazards the focus on or priority of hazards has a similar pattern amongst the municipalities that were interviewed. All interviewed municipalities mentioned flooding, though the specific causes, such as cloudbursts,

high flows, or sea level rise, varied to some extent depending on local conditions. Apart from flooding, eight municipalities mentioned landslides and three mentioned erosion as challenges the municipalities work with, although two stated that they have not progressed as far in addressing these issues yet. The topic of heat also came up, but there were major differences in progress. Four municipalities had conducted heat mapping and three gave examples of implemented measures. Three other municipalities recognized that it is an issue they will need to address in the future. Heat in relation to drinking water and drought was also discussed by three municipalities.

From the interviews there are also clear examples of enablers for expanding climate adaptation work in general. All of the municipalities highlighted the open and generous culture the participants experience from other municipalities, where people want to help each other and share what they have learned. GR's climate adaptation network is part of this culture and is a platform that is put forward as a good way to participate in knowledge exchange. Learning what has and has not worked for others is seen as helpful. However, one municipality noted that this could be expanded and that there is still a need for someone to put new ideas into practice first. In the interviews several other ongoing collaborations were identified, including drinking water partnerships, collaborations related to the regulation of watercourses, water councils, and initiatives such as 8 fjordar. Although climate adaptation is not their main focus, all of these collaborations, as described by the interviewees, address climate change impacts in some way. Another ongoing collaboration mentioned in the interviews is the Delegation for Göta älv, which works with landslide prevention and related events. However, they do not address other climate adaptation issues. In addition, three municipalities report that dialogue is being held with neighboring municipalities regarding comprehensive plans, actions close to the municipal borders and other cross-border matters. This study identifies existing collaborations in the Gothenburg metropolitan area as potential enablers of future collaboration on climate adaptation because their presence suggests both a perceived need for such initiatives and that this form of collaboration is feasible, while also potentially enabling participants to recognize the effects of this type of collaboration. Another enabler mentioned by one municipality, and not identified as a barrier by others, is the existence of technical solutions. The main challenge lies in getting them implemented.

4.2 Situations Requiring Inter-Municipal Collaboration

The interviews indicated that shared drainage basins are the situations in which municipalities perceive the greatest need for inter-municipal collaboration. A drainage basin is an area in which the precipitation flows towards the same watercourse (Petts and Bravard, 1996). From the interviews it was clear that actions taken or measures implemented within a drainage basin in one municipality may affect other municipalities, and in some cases, more effective outcomes may be achieved by implementing measures in a different municipality. This section presents the interviewees' per-

spectives on the need for inter-municipal collaboration in the major drainage basins within GR. Barriers to inter-municipal collaboration in these situations will also be presented. Inter-municipal collaboration may also be required where municipal boundaries intersect residential areas or roads, and barriers for these situations are also presented in this section.

4.2.1 Göta Älv

The drainage basin for the river Göta älv was a topic of discussion during the interviews. As the water leaves the lake Vänern, it flows south before dividing into two branches, one called Nordre älv and the other still called Göta älv, both of which flow into the sea. The river flows through six municipalities and the four southernmost municipalities are part of GR. From the interviews it is clear that Göta älv is affected by climate change through flooding and higher water levels due to sea level rise, as well as an increased risk of landslides in the already landslide prone valley. The water flow in Göta älv is regulated by several hydropower plants, and the river serves as a fairway and a source of freshwater supply for several municipalities. The part of the river that passes through the municipalities that are part of GR is affected by sea level rise, since this leads to increased water levels in the river and increases the risk of flooding. Municipalities located north of the GR municipalities are not affected by sea level rise, due to the presence of a hydropower plant that allows for regulation of upstream water levels. Along the river there are also several nature reserves and Natura 2000 areas.

The shared municipal interests along the river and the potential for measures in one municipality to affect others make climate adaptation along Göta älv a situation that requires inter-municipal coordination. When it comes to climate adaptation for risks in Göta älv, the Delegation for Göta älv is the main actor handling these questions. This became clear during the interviews with the municipalities along Göta älv and a representative from the delegation was therefore contacted and interviewed about the delegation's work, how it can be developed, what barriers they experience and if anything can be learned from this collaboration that can be applied to others. During the interview it was explained that the delegation is a collaboration between municipalities and other stakeholders along the river, initiated by the government with the assignment to support the municipalities along Göta älv to implement measures to prevent landslides. In their work they also include hazards and risks that are related to and can affect the risk of landslides.

The interviewee from the Delegation for Göta älv explained that the delegation is run by a secretariat at SGI and the members in the delegation consist of representatives from the six municipalities along Göta älv, of which four are within GR, as well as the County Administrative Boards of Västra Götaland and Värmland. Another member is the energy company Vattenfall which runs the power plants in the river. The governmental agencies MCF, the Swedish Transport Administration (Trafikverket) and the Swedish Maritime Administration (Sjöfartsverket) are also part of the delegation. SGI identifies and prioritizes areas where measures are

needed and does investigations to suggest measures, however since it is a governmental agency they are not allowed to implement measures, the municipalities get funding to implement the measures. When the municipalities want to build in areas where there is risk of landslides, they can also apply for funding for assessments of the risks. Since SGI does the risk assessments and prioritizes areas for the whole river, this is done with a more holistic perspective than if the municipalities would do it individually. There is also knowledge and experience exchange happening in the delegation, where the municipalities can get help and advice, and learn from the others.

In the interview, the lack of geotechnical expertise in municipalities was identified as the main barrier to the delegation's climate adaptation work. Municipalities with lower populations cannot afford to employ staff with this expertise, which limits their ability to address these issues. The secretariat has therefore had to do more of the risk assessments and investigations than initially planned, and has had to support the municipalities with, for example, material to consultants. It is also a problem when municipal officials with the necessary knowledge end their employment since there is no one else left at the municipality with that knowledge. The internal organization in the municipalities can also be a barrier for the climate adaptation work, according to the interviewee, since many parts of a municipality are affected by these questions and the current organization is not adapted to questions where different departments need to work together. Another barrier to the delegation's work is the lack of clarity regarding SGI's role, leading some municipalities to assume that SGI manages landslide risks, even though responsibility remains with them. The funding to the municipalities for implementing measures is 100%, to make it possible for municipalities and land owners to implement the measures. However, this increases SGI's work with controlling what the money is used for. Lower funding could possibly increase the incentive for the municipalities to seek greater control over how the work is carried out, according to the interviewee, however this would be hard to implement since the municipalities expect full funding. Another thing brought up in the interview that can make climate adaptation measures harder to implement is that other interests than the geo-technical stability have to be considered and can be in conflict. However, SGI is aware of this when creating measures and they work to develop measures that reduce the risk of landslides and create benefits for other interests at the same time, such as nature based solutions.

The sea level rise poses risk to several municipalities in GR and it increases the risk of flooding along Göta älv. To handle this risk in Göta älv there are currently investigations into whether storm surge barriers can be built in Nordre älv and where Göta älv discharges into the sea. These barriers would affect all of the GR municipalities along Göta älv, according to the interviewed representative from the Delegation for Göta älv. The work is led by one municipality, and there has been some dialogue between this municipality and another about the placement of the barriers, but based on the interview answers there does not seem to be any work yet that includes all the affected municipalities or the Delegation for Göta älv. However, the municipality that is working with the investigations mentioned in their

interview that a cooperation between the municipalities will be needed when the work has progressed further. The storm surge barriers constitute a large and costly measure. Two municipalities emphasize that the barriers should be classified as a matter of national interest. One interviewee explained that such a classification is crucial in order to weigh the project against other national interests, although the legislation governing prioritization between national interests remains unclear. Additionally, one interviewee expressed that state funding should cover a significant share of the project's costs. A pilot study on the storm surge barriers indicates that Säveån will also be affected by the barrier system (Sweco and Arcadis, 2015). As a result, multiple stakeholders along the river will need to coordinate in the operation of the storm surge barriers. This was not raised in the interviews but represents a potential need for increased cooperation in the future.

4.2.2 Säveån

Säveån is a stream that flows through six municipalities before joining the lower part of Göta älv. Four of these municipalities are part of GR. Among the municipalities located along Säveån, all those interviewed perceived the stream and the climate-related hazards associated with it as requiring inter-municipal cooperation. The municipalities along Säveån have problems with landslides, erosion and/or flooding along the stream. They see a need for cooperation where focus is on climate adaptation to handle these risks. Actions taken in one municipality can potentially affect conditions in other municipalities, and in some cases, solutions may be more effectively implemented in a different municipality than the one experiencing the problem. The interviewed municipalities along Säveån therefore emphasize the need for collaboration that enables management of the stream from a holistic, drainage basin-based perspective. They also highlight the importance of collaboration with other relevant stakeholders. GR will therefore start a project that could lead to collaboration on climate adaptation in Säveån. The idea is to create a forum for cooperation between multiple municipalities and other stakeholders where focus is on identifying needs, addressing goal conflicts, and prioritizing measures, to develop a holistic perspective on the drainage basin. However, when discussing collaboration about Säveån in the interviews, one municipality mentioned that to implement a drainage basin perspective in the planning within the municipality is difficult since the existing planning structures are based on local planning and each geographical area is often planned on its own, without a more holistic perspective. The interviewee therefore thinks it is even harder to implement the drainage basin perspective in inter-municipal collaboration. This challenge is another reason why GR will start the project. GR and the municipalities see a need to tackle this challenge and hope that their findings and methods they develop during the project later can be used in other drainage basins.

One ongoing collaboration mentioned in the interviews is the water council for Säveån that different stakeholders along the stream are a part of, such as officials and politicians from the municipalities, power plants, companies and advocacy organizations. The council primarily addresses water quality issues, although some of

the measures implemented may also yield benefits for climate adaptation. Similar water councils also exist for Kungsbackaån, Mölndalsån and Göta älv. Some of the measures water councils decide on are also climate adaptation measures, but they are implemented because of their effect on water quality, meaning that there might have been stronger synergic effects that were missed due to the lack of the climate adaptation perspective. Three of the municipalities gave water councils as an example of an existing collaboration that might be expanded to also include discussions about climate adaptation. However, one municipality expressed that the climate adaptation responsibility can not be included in the water councils as they are formed today, since the right persons are then not included. The people in the collaborations today have knowledge about water quality and to create a climate adaptation collaboration would require people with other knowledge, but also people with a more holistic view of the problems and the municipalities' and other stakeholders' interests. These people can be hard to find since the climate adaptation responsibility is often spread across different departments of a municipality, and in municipalities with lower population there is rarely one person who only works with climate adaptation and has a clear responsibility for it. Another constraint linked to the integration of climate adaptation into existing collaborative structures was highlighted by one municipal official. When applying for funding for aquatic environment improvements from the county administrative boards, or for nature conservation from the Swedish Environmental Protection Agency, applications can not explicitly frame these measures as also being climate adaptation. Consequently, the potential of such measures to contribute to climate adaptation may be downplayed.

Another ongoing collaboration revealed in the interviews is between three municipalities regarding the use of a lake along Säveån for drinking water supply, as well as the regulation of its water levels to avoid flooding of urban areas close to the lake. The aim of this collaboration is to explore the feasibility of using the lake as an alternative drinking water source, particularly during periods when the water supplies in Göta älv are not usable. According to one interviewee there are several reasons why water from Göta älv may become unsafe, including seawater intrusion and landslides. Both risks are more likely to occur during periods of low river flow. However, during such periods, Säveån often also experiences low water levels, which can increase the risk of landslides and regulating the water level could increase this risk downstream. This highlights the critical need for cooperation not only between municipalities but also across different fields of expertise. This situation also shows how climate-related hazards in the region are interconnected, which increases the overall complexity and reinforces the need to handle these problems with a holistic perspective.

A collaboration about Säveån would also have to consider the legal permits that regulate how much water the power plants can release to the stream. This might complicate the overall work, although they do not necessarily constitute a direct barrier to inter-municipal collaboration. One municipality noted that, during the review of these permits, there may be an opportunity to reassess their design, for

example, by shifting from flow-based to level-based regulations, which could be beneficial from a landslide risk perspective. The existing collaboration regarding the use of a lake along Säveån for drinking water supply and regulation to avoid flooding also considers the levels in the power plant and can therefore affect the flow downstream in Säveån. The interviewee hopes that these projects can benefit from each other and then also decrease the risk of landslides. This could be an enabler for further collaboration.

When it comes to collaboration regarding the implementation of measures in Säveån, municipalities differ in which other municipalities they perceive a need to collaborate with. Two are highly dependent on upstream measures and therefore primarily seek collaboration with municipalities upstream of their own location. One is less affected by actions taken elsewhere and consequently have different collaboration needs. Although these differences are not directly stated as a barrier to collaboration it is possible to think that this might complicate the organization of collaboration and make it challenging to establish arrangements that benefit all municipalities enough to be motivated to participate. If the solution to one municipality's issue is to implement measures within another municipality a concern was raised by one interviewee about how both parties would get sufficient benefits out of it, especially when including lost exploitation opportunities or land values. Related to this, one municipality emphasized the importance of involving an objective third party in the collaboration process to ensure that all municipalities are heard and to help manage power dynamics that can arise from differences in the municipalities prerequisites.
Another issue that was brought up by the same interviewee was that the discussions regarding Säveån are currently happening between municipal officials but for things to start happening it needs to be brought up to a level within the municipalities in which decisions can be made. Nevertheless, all interviewed municipalities emphasize the value of broader cooperation for knowledge and experience exchange, as they face similar challenges along Säveån. This exchange happens to some extent today in different groups and settings, and these already established contexts could be used to expand the collaboration and increase the focus on climate adaptation. One municipality highlighted that stakeholders with whom municipalities see a need for greater collaboration could beneficially also be invited to these meetings.

4.2.3 Mölndalsån and Kungsbackaån

In addition to Säveån and Göta älv two other drainage basins were brought up during the interviews. The drainage basin area for Kungsbackaån, also called Lindomeån, includes four municipalities of which three are part of GR. Kungsbackaån was mentioned in the interviews in connection with an ongoing inquiry into potential measures to delay water upstream in order to mitigate flood risk downstream. If this inquiry shows that such mitigation measures are feasible and would need to be implemented in another municipality than the one exposed to the risk, there may be a future need for inter-municipal collaboration. There has been some dialogue about conducting the procurement of the investigation together with another municipality, and although this collaboration attempt did not materialize, this could

be interpreted as an indication that inter-municipal collaboration may be relevant for Kungsbackaån.

The attempt to conduct a joint procurement about climate adaptation in Kungsbackaån reveled several challenges. The municipalities had different interests and they had too little knowledge about those kinds of procurements, therefore the process became complicated and took too long so one of the municipalities' budgets was no longer available for the project. The municipalities also had different purposes or questions for the investigation, which also made the procurement more difficult. The division of responsibilities was also unclear and legislation about the procurement and what the municipalities were allowed to do in this type of situation were also hindering factors. Since the municipalities have not reached any joint measures, they do not know which barriers there would be in the planning or implementing of the measures. However, they think that if a measure located in one of the municipalities would benefit the other, a discussion about financing would probably be needed since they do not have any models for this type of financing yet. The municipalities are also located in different county administrative boards which, according to the interviewees, could complicate a collaboration about measures since more stakeholders might need to be involved.

Mölndalsån is another stream that runs through three municipalities, all of which are a part of GR. In contrast to Kungsbackaån, which is unregulated, municipalities along Mölndalsån collaborate to regulate the water flow and reduce the risk of flooding. However, the collaboration is only for regulating and does not handle other climate adaptation questions or measures, which one of the municipalities along the stream expressed a need for and said is a barrier to develop inter-municipal collaboration in those questions. It was also noted that sea level rise may affect Mölndalsån by hindering the outflow of water into Göta älv. This may indicate a need to expand collaboration along Mölndalsån.

4.2.4 Common Infrastructure

Municipal boundaries do not only divide natural features such as streams, but can also pass through residential areas and roads. This was not an issue brought up by the municipalities themselves but when asked specifically about a residential area some answers were given. In one example, the area was a quite small town in which at least one of the municipalities had not carried out a cloudburst map and therefore did not know whether collaboration could be of interest. Other times there were cloudburst maps, but they always cut off at the municipal boundary. The interviewees said in general that if there are issues, collaboration could be of interest, but for any action to be taken it needs to be of public interest, not only of interest to individual actors. Since the cloudburst maps often cut off at municipal borders it could result in having to compare different municipalities' cloudburst maps and this could become harder due to the fact that the municipalities use different risk levels and other standards. One municipality argues that it is pedagogically problematic that neighbors must adhere to different levels of protection depending on which side

of the boundary they reside, while another views it as inequitable and suggests that common standards would be beneficial. Two interviewees also mentioned, in a hypothetical meaning, that it could become an issue if one municipality takes actions that lead water towards the other municipality.

When asked in the interviews if roads crossing municipal borders is a situation where inter-municipal collaboration is needed, the general opinion of the interviewees was that matters concerning roads more often involve The Swedish Transport Administration than other municipalities. However, one shared municipal road was mentioned in an interview, indicating that there may be situations involving shared roads where collaboration between municipalities could be of interest. In addition, other infrastructure, such as the wastewater system, may be relevant for collaboration, but the interviewees in this study could not provide in depth information on it.

4.3 General Barriers to Develop Climate Adaptation

In the interviews, barriers not related to a specific situation, but to inter-municipal collaboration in climate adaptation overall or to municipalities' internal climate adaptation work were also identified. In this section these barriers will be presented.

4.3.1 Barriers for Inter-Municipal Collaboration

This section presents barriers to inter-municipal collaboration on climate adaptation measures, as identified in interviews with municipalities. These barriers were not expressed in direct relation to specific situations, but may nevertheless influence those situations as well as others. The barriers are compiled in Figure 4.1 and can be grouped into two categories: uncertainty and lack of experience, and organizational and institutional constraints.

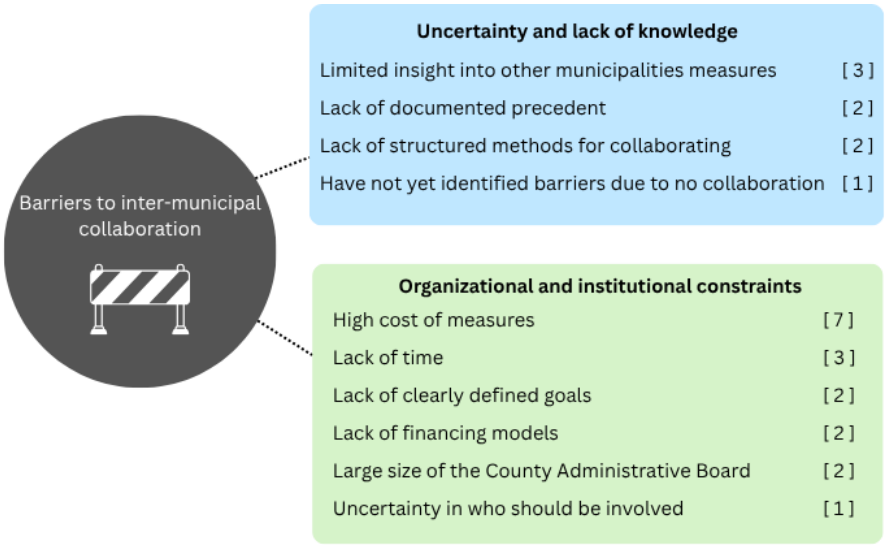

Figure 4.1: Compilation of barriers to inter-municipal collaboration on climate adaptation identified in the interviews with the municipalities (n = 9). The numbers in parenthesis show how many municipalities discussed each barrier in their interview. Other interviewees may also agree with barriers that did not come up in their own interview, however this is not reflected in the figure.

Uncertainty and lack of experience

Two of the municipalities that have come the farthest in their climate adaptation work, think that it is a problem that there is no documented collaboration to look to as a precedent. There is also a lack of structured methods for how to work with climate adaptation together with other municipalities which makes it more difficult to initiate a collaboration. One of them also said that since they have not had any inter-municipal collaboration about implementation of climate adaptation measures, it is hard to know what barriers could occur.

Regarding the exchange of information and experiences between the municipalities, five interviewees said that they mainly get information about other municipalities' measures, implemented or planned, from the climate adaptation network meetings. All interviewed municipalities described the network meetings as a forum for knowledge and experience exchange, providing valuable opportunities for shared learning, which is appreciated by all interviewees. However, three municipalities still said that they have limited insight into other municipalities' measures and that information about it is not easily accessible on, for example, the municipalities' websites. Better insight could lead to better understanding of how other municipalities' measures affect one's municipality's planning or measures, and it could lead to more collective learning, which could benefit climate adaptation work and collaboration.

Organizational and institutional constraints

Lack of time is stated by three municipalities to be a barrier for inter-municipal collaboration. Many who work with climate adaptation do not have time to initiate or

participate in collaboration since they are responsible for many other things as well. In seven of the interviewed municipalities, climate adaptation is either not assigned to a specific role, or it is assigned but as part of a broader set of responsibilities. One municipality mentioned that unclear responsibility divisions in other municipalities can make it difficult to initiate collaboration, as it is unclear who should be involved. When creating collaborations where climate adaptation interests could be considered, climate adaptation has to be included in the goals of the collaboration according to one municipality. If it is not, then time and other resources are not designated to the climate adaptation interests.

In the interviews, two municipalities highlighted the lack of existing financing models for co-financing climate adaptation measures as a factor that complicates inter-municipal collaboration. Many climate adaptation measures are expensive to implement, as noted by seven of the municipalities, which further complicates this work. Different interpretations and understandings of laws and regulations were also identified in the interviews. For example regarding the financing of measures in other municipalities, as regulated by the Swedish Local Government Act, when such measures are intended to benefit one's own municipality. This may indicate a need for clearer regulations in this area.

The county administrative boards has several responsibilities related to climate adaptation, including supporting municipalities and coordinating climate adaptation efforts within the county. This could mean that the work of the county administrative boards can have a significant impact on inter-municipal coordination of climate adaptation. The large size of the Västra Götaland County and its many municipalities (n = 49) were highlighted by two municipalities as factors that make it unreasonable to expect the County Administrative Board of Västra Götaland to coordinate to the same extent as in counties with fewer municipalities. One interviewee also noted that this limits the county administrative board's ability to develop municipality-specific knowledge, which in turn can make it more difficult to review climate adaptation in planning documents based on local conditions. In the interview with an official from the County Administrative Board of Västra Götaland, the size of the county was described as influencing how they are able to work, making it more difficult to maintain direct contact with municipalities due to their large number. At the same time, the size of the organization allows for more specialized roles, including staff working strategically with climate adaptation. However, the large organization also creates a need for internal coordination on these issues. The interviewee from the County Administrative Board of Västra Götaland also stated that changes in the government's appropriation directions in 2023 led to a rapid decrease in funding for climate adaptation work. This affected ongoing initiatives, limited the extent to which the agency could work with these issues, and resulted in a scattering of expertise.

4.3.2 Barriers to Internal Climate Adaptation Work

Barriers to internal climate adaptation work were also identified in the interviews and will be presented in this section. These barriers do not directly affect the inter-municipal collaboration, but can have an effect on for example how far a municipality has come in their work or if they have time for collaboration which in turn could have an effect on the ability to collaborate. These barriers are summarized in Figure 4.2 and can be divided into the categories: uncertainty and lack of knowledge, unclear responsibilities and organizational challenges, prioritization and political governance, external dependencies, and complexity and system dependencies.

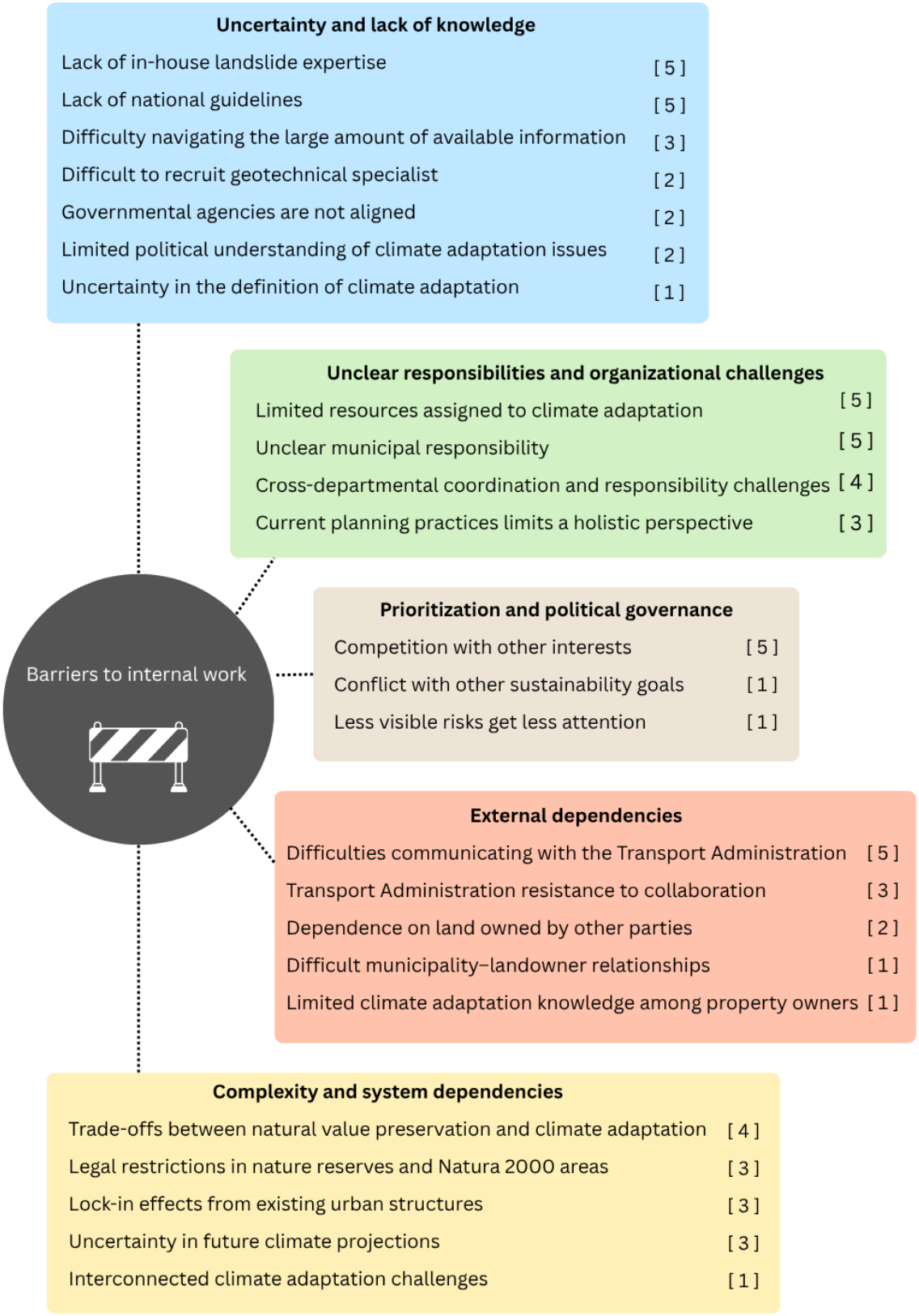

Figure 4.2: Compilation of barriers to internal work with climate adaptation identified in the interviews with the municipalities (n = 9). The numbers in parenthesis show how many municipalities discussed each barrier in their interview. Other interviewees may also agree with barriers that did not come up in their own interview, however this is not reflected in the figure.

Uncertainty and lack of knowledge

A municipality that is in the early stages of their climate adaptation work expressed that they do not know what obstacles might come their way yet or what challenges they might find. Five of the interviewees stated that a lack of expertise regarding landslides within municipalities constitutes a barrier to addressing the landslide issue in general. At least two of the interviewees noted that recruiting geotechnical specialists to municipalities is challenging, as the role can be isolating and carries significant responsibility. Having an in-house geotechnician at the municipal level is uncommon today and the five interviewees which saw lack of expertise as a barrier suggested exploring ways to share geotechnical expertise across municipalities in different ways. This could perhaps reduce costs by sharing access to expensive geotechnical software that municipalities might otherwise not invest in.

Five municipalities pointed to the lack of national guidance on risk levels or scenarios as a challenge or noting that such guidance could facilitate their work. To the extent it exists today, it is only applicable for planning new buildings, but according to one interviewee, there is also a need for these guidelines for existing buildings. The lack of national standards can become a barrier when municipalities need to compare documentation or material, and it causes extra work and uncertainty for the municipalities when they have to check what different governmental agencies say and decide what to use by themselves. In addition, two municipalities underscores the importance that these guidelines have to be adjustable after local conditions. Different scenarios and factors can be needed for different situations, risks or timeframes, and it is important, according to one municipality, that national guidelines are adjustable to this.

Governmental agencies are not always aligned, which two municipalities state makes it more difficult to use their material. One municipality further note that this can lead to having to redo plans or calculations if incorrect scenarios are used. This could be avoided through early dialogue in the planning process. One municipality mention that material from governmental agencies may also present different results regarding risks compared to the material developed by the municipality, for example when different risk factors have been used. This can cause confusion and uncertainty. Furthermore, if municipalities lack the knowledge to interpret material from governmental agencies from a critical and local perspective, it may lead to over- or under-dimensioning of measures. The large amount of available material is, according to three interviewees, beneficial but also difficult to navigate.

The knowledge about climate adaptation within the municipalities, including politicians, affect how the work is conducted. One municipality mentioned that they invited a governmental agency to have a lecture for the politicians about climate and climate adaptation, and how this had increased the politicians knowledge about these topics, which enabled further climate adaptation work. Another municipality talked about the education available for new politicians and how these can affect their understanding of different topics and challenges. Knowledge about the term climate adaptation and what it includes can also be a challenge to climate adapta-

tion work, according to one municipality and the County Administrative Board of Västra Götaland. If stakeholders involved in a collaboration define climate adaptation differently and vary in the extent to which they include aspects such as hazards, measures, or operational activities within the concept, it can become a barrier and make collaboration more difficult. They also said that there can be different understandings of the terms climate adaptation and climate mitigation, what they include and how they relate to each other. The understanding that the two needs to be handled simultaneously can also be lacking. It is therefore important to create a common understanding of these terms to facilitate collaboration.

Unclear responsibilities and organizational challenges

Three municipalities highlighted challenges associated with climate adaptation being a cross-departmental issue that involves multiple municipal units. The cross-departmental character of climate adaptation can lead to uncertainty regarding who within the municipalities should take responsibility in leading the work with climate adaptation. Unclear responsibility or lack of knowledge about climate adaptation in different departments can also result in the loss of a climate adaptation perspective in operations, where this perspective might have been beneficial to include. Four municipalities mention that they have to find new ways to or start to integrate the climate adaptation work into the municipality's operation. This is because several departments are affected by climate change and therefore need to work with climate adaptation. There also has to be communication between different departments since persons with different roles experience the work and barriers in different ways. Three municipalities also talked about how the municipal planning today mostly happens through local planning or projects and that there is a lack of a more holistic perspective in the planning. This can lead to a lack in understanding of how different areas affect each other.

As mentioned earlier, there is a lack of time allocated to climate adaptation. Five interviewees stated that they are restricted by the time they are assigned to work with climate adaptation within their roles, which affects the ability to develop the work and can, for example, limit how many risks can be addressed simultaneously. If there is a lack of knowledge within a municipality about a risk or measure for example, then it also takes time to learn about the topic. However, when a person works within several different areas, they can apply the climate adaptation perspective in the other areas. This could enable more inclusion of the climate adaptation perspective in collaborations that are already existing but do not focus on climate adaptation. Five interviewees also expressed in different ways that the responsibility of the municipality is unclear when it comes to handling effects of climate change. What they should do, can do and what citizens expect them to do differ. This uncertainty may slow the transition from planning to the implementation of concrete measures. It is also connected to how municipalities interpret the principles of equal treatment and local connection in the Swedish Local Government Act.

Prioritization and political governance

Ultimately, municipal climate adaptation work needs to be politically anchored. Decisions regarding the implementation of measures, budget allocations, and priority areas therefore need to involve local political actors. Even though this extend the processes, this is not stated as a barrier by the interviewees, it is how the democratic system works. The high cost of implementing many climate adaptation measures, as mentioned previously, also necessitates political decision-making. That the political opinions differ between municipalities and that it in theory possibly could be an issue when trying to come to an agreement was, however, brought up by one municipality.

Five municipalities talked about that climate adaptation is just one of many interests a municipality has and the competition with other interests, such as for example exploitation, makes it harder to get climate adaptation on the agenda. One municipality further noted that other sustainability goals may come into conflict with climate adaptation objectives, which complicates implementation, as it requires the identification of solutions that reconcile competing objectives. The interviewee also mentioned that the consequences of a given risk and their visibility may influence the level of attention the risk receives and the ease with which measures are implemented, which might lead to other risks being overlooked. Another municipality mentioned that measures which also contribute to enhancing urban attractiveness or provide additional co-benefits may be more readily implemented than other necessary measures.

External dependencies

Two municipalities mention that they have experienced difficulties when it comes to measures needing to be done on land owned by another party. One municipality said that landowners' attitude towards climate adaptation measures and involvement of the municipality differs a lot and indicated that the relationship between landowner and municipality at large is the issue rather than the climate adaptation aspect of it all. Another municipality talked about how the climate adaptation knowledge of property owners affect which measures are taken to protect private properties, since this is not the municipality's responsibility. Municipalities' measures can sometimes benefit private owners, however they do not have responsibility or are allowed to take measures that primarily benefit private properties. The division of responsibility between property owners and the municipality regarding measures is not always clearly understood by property owners, according to the interviewee. In the climate adaptation inquiry (SOU 2025:51) there is a suggestion that a municipality should be able to charge property owners that benefit from the municipality's measures, thus there is ongoing work in this area. One municipality suggested jointly developing communication materials for distribution to property developers. Collaboration with other municipalities could simplify the process by ensuring a shared message and potentially saving time, although the interviewee noted that such initiatives would require political approval.

There are often vital roads within a municipality owned by the Swedish Trans-

port Administration, which has in several instances caused issues for the planning in municipalities since some of these roads will be affected by climate change both through flooding and landslides. The Swedish Transport Administration is a governmental agency responsible for state roads and railways, and the long-term infrastructure planning of these, as well as shipping and aviation (Trafikverket, 2022). In questions regarding climate adaptation and state roads, the Swedish Transport Administration is therefore the party municipalities need to work with. According to five interviewees, the municipalities wish that there would be better communication and collaboration with the Transport Administration. It has also been said that the agency sometimes look at issues at a longer timeframe and uses different risk levels than municipalities and therefore have other priorities than the municipalities about measures and planning. The agency's large size and tendency to adopt a more reactive approach are also highlighted as factors that make collaboration more difficult. Three of the interviewees have experienced a resistance from them in terms of collaboration.

Complexity and system dependencies

From the interviews it was also clear that the complexity of climate adaptation makes addressing the issue more difficult. One municipality explained in detail how climate adaptation challenges are interconnected, as issues such as stormwater management, flooding, and landslides are closely linked. This is particularly evident in some natural systems, where connections between hydrological, ecological, and geographical components create complex dynamics that need to be considered in planning processes. Uncertainty further complicates this work, according to three municipalities, as future climate conditions are difficult to predict due to its complexity. In addition, existing urban structures may lead to lock-in effects that limit the range of adaptation measures. One municipality said that their main urban area, which was established during the industrial revolution, would likely not have been located there if planned today, due to the high risks this area is exposed to today. Two other municipalities mentioned that existing development in certain areas affects the extent of climate adaptation measures needed or limits the possibilities for implementing such measures.

Four municipalities also highlighted conflicts between climate adaptation efforts and the preservation of natural values. Some areas that are exposed to climate-related risks, or where measures need to be implemented to mitigate risks in other locations, are protected by law. Three municipalities reported that they are working, or will need to work, in areas designated as nature reserves or included in the EU network Natura 2000, as well as in locations where protected species must be taken into account. Examples mentioned in the interviews include areas connected to rivers, streams, and coastal zones. This legislation influences how municipalities can implement climate adaptation measures, affecting both the types of solutions that are permitted and the timing of implementation. These constraints are also important to consider in inter-municipal collaboration, particularly when shared natural systems are involved.

5
Discussion

This section begins with a comparative analysis of the results, exploring possible explanations for the findings and highlighting recurring patterns identified in the interview responses. Thereafter are key factors identified throughout the study that should be considered in the design of inter-municipal collaboration proposed. The section also reflects on the delimitations and limitations of the study and how these may have influenced the results.

5.1 Comparative Analysis of Results

Two of the municipalities among those which have progressed the furthest in their climate adaptation work highlight the lack of documented collaboration and co-financing models as a challenge, particularly the absence of established examples or precedents to draw upon. Their position appears to place them in a role, where they are moving ahead of existing frameworks and practices, rather than being able to rely on them. This suggests that these municipalities are not only at the forefront within the region, but potentially also at a national level. Consequently, they face challenges associated with pioneering work, including the need to develop new forms of collaboration without established models to guide them. This also aligns with other municipalities identifying these two municipalities as precedents to look to. One might expect that differences in the level of progress between municipalities would pose a challenge for collaboration, however, based on the interviews, this does not appear to be the case when it comes to knowledge sharing. Instead, learning is said to occur in both directions. How collaborations in other forms might be affected by the differing levels of progress was unclear from the interviews. Regardless of progression, time is stated as a barrier for the majority of municipalities. The lack of time to carry out what municipal officials already know needs to be done, suggests that the issue is not a lack of awareness but rather a lack of capacity to address it, as well as there being potential barriers that slow down the process.

No clear correlation can be observed between municipal revenue levels and whether high costs are perceived as a barrier. Since climate adaptation expenditures are dispersed across different parts of municipal budgets, it is difficult to determine how much each municipality allocates specifically to climate adaptation measures. Nevertheless, this suggests that the costs are substantial enough to pose challenges not only for municipalities with below-average tax revenues per capita. The high cost of measures does make collaboration more complicated, but it might also be an

incentive to collaborate, since finding the most cost effective solution becomes more important and might require collaboration. Several other patterns were investigated, such as whether a higher share of citizens in heat risk groups (0–9 and 70+) correlated with working more with heat-related risks, which was not the case. Neither was there a clear correlation between how far municipalities have come in climate adaptation (based on the IVL ranking) and population size or tax revenue per capita.

Some potentially intuitive patterns were found and are still interesting to mention. Municipalities that do not share, for example, residential areas, drainage basins, or lakes with other municipalities, do not see specific situations where inter-municipal collaboration is needed. In contrast, the strongest need for inter-municipal collaboration was expressed by those located within drainage basins that cross several municipalities. The focus on this particular type of issue could, in addition to it being a clear challenge that has caused issues, also be due to the selection of interviewees. Other issues might be handled by other parts within the municipality and therefore might have been overlooked in this particular study.

The collaboration needs identified in the interviews may partly depend on which climate-related events the interviewees currently are working with. The result has shown that the municipalities only work with some of the climate-related events that were listed in Section 2.1. Flooding, landslides and erosion are events that must be considered in the comprehensive plan, which might be one reason why many municipalities have focused on these issues first. As well as the region being one of the most vulnerable areas in Sweden to these risks. The interviews mainly capture collaboration needs connected to the issues prioritized by the municipalities and for which they have responsibility. If the municipalities in the future expand their work to include additional events, other collaboration needs may emerge. Given resource constraints and institutional conditions the prioritization of a limited number of events may be reasonable. However, this raises questions regarding if there is a risk that other events with severe consequences are overlooked or postponed to when the consequences are more severe and more difficult to manage. There might also be a risk that the focus on a few events reduces the ability to apply a holistic perspective and measures that could handle multiple events might be missed. These challenges are further complicated by the uncertainty associated with future climate change and adaptation needs, since predictions about the severity of the events can change and affect municipalities priorities.

Another pattern found is that even though most of the municipalities in GR have borders crossing through forest areas, there was no perceived need for inter-municipal collaboration in these areas from any of the interviewees. There is also little collaboration between coastal municipalities about climate related measures, according to the results. Again, it is possible that responsibility for these areas lies with other municipal departments, meaning that collaboration needs related to climate adaptation may not have been recognized by the interviewees included in this study. It was not clear from the interviews whether potential collaboration needs within these types of geographical areas have been investigated or to what extent climate-related

hazards have been investigated in these areas.

5.2 Key Considerations for Future Climate Adaptation Collaborations

It is clear from the results that the institutional system within which municipalities operate is not designed to effectively address climate adaptation. Fragmented governance structures, existing budget divisions, and the distribution of responsibilities do not align with the spatial and systemic nature of climate impacts. In order to move forward with climate adaptation, system weaknesses need to be handled. This can be done by either finding new ways within the current system, which seems to be the focus of the municipalities today, or change the system at its root. Climate adaptation can be understood as a wicked problem, characterized by inter-dependencies between multiple actors, uncertainty regarding future climate developments and impacts that cut across administrative sectors and departments. The municipalities' ability to work with climate adaptation and engage in collaboration is strongly influenced by actors outside the municipal organization. The approaches to climate adaptation adopted by national authorities, county administrative boards, and the government affect municipalities through guidelines, supervisory processes, funding applications, and the provision of knowledge and decision-support material. This further illustrates the wicked character of climate adaptation, where responsibilities, knowledge, and decision-making are distributed across multiple interconnected actors and governance levels. Future collaboration effort within climate adaptation will need to be able to handle these connections.

It may be unreasonable to consider fundamental changes in governance structures, since climate adaptation is only one of many functions and responsibilities that society and public administration must manage. However, it is still important to recognize that the current institutional system is not fixed or inevitable, but socially and politically shaped and therefore possible to change over time. In the present context, it may be more relevant to focus on smaller-scale adjustments and forms of collaboration that can improve climate adaptation within existing structures, while still acknowledging the broader structural limitations of the system.

When initiating collaboration, it may be important to consider how collaborative structures can be designed to remain resilient to changes in the surrounding system. Collaborations that are highly dependent on specific individuals, temporary funding, or current institutional arrangements may risk becoming fragile over time. Developing durable forms of collaboration could therefore be important for maintaining continuity and long-term capacity. At present, climate adaptation work within municipalities is often highly dependent on specific individuals. In many cases, one or a few people hold a large share of the knowledge and are responsible for driving the work forward. This means that if key individuals change positions or leave the organization, the work may slow down or stall and integrating new actors into ongoing collaborations can require significant time and effort. As a result, collaborations

become more fragile and vulnerable to organizational change. It is therefore important to find strategies to maintain the knowledge within the municipalities and collaborations, however, such strategies have not been identified in this study.

The way collaboration is initiated could potentially have an impact on the resilience but also the effectiveness of the collaboration. In the interview with the Delegation for Göta älv, the concept of top-down versus bottom-up approaches to collaboration was discussed. The Delegation for Göta älv is an example of a top-down form of collaboration, initiated and funded by the state. The top-down approach has in this case been effective since it has made it possible to pass several of the barriers collaboration otherwise get stuck at, such as co-financing, the need of someone to be the driving force and the high cost of measures for the municipalities. On the other hand, the top-down approach also entails risks. Sometimes top-down approaches are funded by the state which can create dependency on state support and if funding conditions change, there is a risk that the entire initiative could collapse. Getting participants to be positive about contributing could potentially also be difficult. In the case of Göta älv, municipal participation appears to have been easy to secure due to the high incentives for involvement. Based on our findings, there was no need to mandate participation through regulatory measures.

The flood risk management in the Seveso river basin in the Milan metropolitan area (Vitale and Meijerink, 2021), as described in Section 2.4, could be seen as an example of when the top-down approach caused issues for collaboration. Due to flooding events in Milan the issue was seen as a question of security, allowing regional authorities to reduce opportunities for political negotiation and participation. Regional authorities, the City of Milan, and technical agencies made the key decisions, while upstream municipalities, where the measures were to be implemented or which would be affected by them, had very limited influence over the planning process. The concentration of decision-making power among higher-level actors is therefore interpreted by us as indicative of a top-down approach. Even though the planning process went faster and decisions could be made quicker than if more stakeholders would have been included, this power asymmetry caused strong opposition from the upstream municipalities and led to the process of implementation taking longer due to legal actions and public resistance, which hindered development of collaboration. This shows that in situations in which a solution to one problem will affect others negatively, the top-down approach can be difficult.

In contrast to the top-down approach, the bottom-up approach to collaboration is initiated by the participants themselves, for example municipalities (Erlingsson et al., 2021). The bottom-up approach could therefore possibly be used to build collaborations without state dependency or centralization of power, as could be seen in the Delegation for Göta älv and the case of the Seveso river basin respectively. However, a bottom-up approach can meet challenges related to efficiency and funding (Erlingsson et al., 2021). Since a bottom-up initiated collaboration is based on the participants' own will and includes all involved parties in the process of designing the collaboration, it can be argued that this approach is positive in terms of democratic

legitimacy. When including more parties in a collaboration there are also more interests to consider, which may slow down the processes. The interviews showed that it can be difficult to find someone willing to take the lead in initiating collaboration. Even if several municipalities are positive towards it, someone still needs to take responsibility to get it started. Regardless of how the organization of a collaboration including multiple municipalities are constructed, the interviews showed that there is a need for an objective party, such as for example GR or a governmental agency, to be included. Having an objective party lead the discussions can help ensure that all voices are heard and reduce the risk of unnecessary conflict arising from some participants dominating more than others. It is also a way of handling power dynamics that might exist in the collaboration. The need for an objective part might not be the same if it is a collaboration between only two municipalities on a specific project.

The results clearly show that the municipalities included in this study differ in terms of organizational structures, resources, and organizational capacity. Consequently, climate adaptation is, and will likely continue to be, integrated into municipal organizations in different ways. The wide variety of responses given during the interviews may indicate that municipalities work with climate adaptation in different ways, have reached different stages in the process, and potentially pursue different priorities or goals. This supports the conclusion expressed by several interviewees that there is no single or universally applicable way of working with climate adaptation. The development of different municipalities' organizations have created institutional path dependencies that the integration of climate adaptation now have to adjust to. What these differences imply for the potential to expand inter-municipal collaboration remains uncertain. However, these findings suggest that successful collaboration may require time and effort in the initial stages to better understand each other's organizational conditions, priorities, and capacities in order to establish common understanding. What climate adaptation includes and how legislation should be interpreted are examples of things that could be good to discuss based on findings in this study. Creating a common understanding may become particularly important since collaboration in climate adaptation is likely to involve actors with different professional backgrounds, responsibilities, and perspectives. Working together to visualize a common desirable future can also be helpful in climate adaptation work, since this can guide decisions, facilitate the coordination of measures and avoid unwanted lock-ins. Backcasting is one method that could be used to build a common understanding and direction for future work (van der Voorn et al., 2023)

The results also show that people who work with climate adaptation will perceive challenges and potential measures from different perspectives and therefore develop different forms of knowledge and experiences. The exchange of perspectives, both within and between municipalities, may contribute to the development of more effective and comprehensive measures, while also facilitating implementation. When more knowledge and experiences are considered, it becomes more likely that measures are effective throughout all stages, from design and planning to implementation and operation, which may help prevent unwanted lock-ins in future adaptation

processes. These collaborations will in many cases also have to involve external stakeholders. Including relevant actors, the right individuals, and appropriate expertise appears to be important not only for enabling implementation, but also for ensuring a more holistic perspective on climate adaptation challenges and solutions. The perspectives included in a process influence which issues are recognized and prioritized. In the case of the Seveso River, it was evident that the interests of smaller municipalities were excluded (Vitale and Meijerink, 2021). The group of experts involved consisted mainly of hydraulic engineers, which meant that water quality issues were overlooked during the planning stages. This proved problematic for the municipalities where the measures were ultimately implemented. At the same time, involving a larger number of actors increases the complexity of collaboration processes. This creates a greater need for clearly defined shared goals, common priorities, and mutual understanding in order to avoid misunderstandings and conflicts. This collaboration process may also require more time, however time has been stated as a barrier by the interviewed municipalities, which limit the possibility of collaborating. Involving all relevant stakeholders might not be possible in all collaborations, it is however important to be aware of what interests are not involved, so that risks or disadvantages for these can be analyzed as well.

5.3 Effects of Delimitations

The delimitations of this study may have introduced several sources of bias. One important factor is the limited representation of roles among interview participants. Officials working in different roles (e.g., strategic versus operational) are likely to hold differing perspectives on climate adaptation. This may influence what they perceive as relevant or important, potentially resulting in role-specific accounts rather than a comprehensive representation of municipal practices. Moreover, as each municipality was represented by only one or two individuals, the findings may reflect individual perspectives rather than the municipality as a whole, thereby increasing the risk of individual bias.

The length of employment within the municipality, as well as prior professional experience, may affect what aspects were emphasized in the interviews. Individuals who have worked longer within the municipality may possess broader institutional knowledge and a deeper understanding of previous work related to climate adaptation. In contrast, newer employees may focus more on current practices and may be less influenced by established ways of working within the municipality.

The choice of semi-structured interviews as the data collection method may have affected the result. Semi-structured interviews and the open-ended questions made it possible to capture more of the interviewees' experiences and opinions. It allowed follow up questions to understand topics further and the interviews could be adapted to each municipality's situation so that their specific experiences and knowledge could be compiled. However, the answers to the open-ended questions depended on the interviewee's interpretation of the question. The fact the all questions were not asked in every interviews made the analysis and comparison of the

answers more difficult since it was not always possible to compare what all municipalities had answered to a certain question. Some municipalities might agree with a statement even though it was not brought up in the interview.

Finally, what respondents are currently working on or have recently discussed may influence their responses. This can lead to recall bias, where certain issues are more likely to be mentioned due to their recent relevance regardless of their overall significance.

5.4 Limitations

A limitation of this study is that not all intended participants could be reached, which may have affected the breadth of perspectives included. Additionally, the researchers' understanding of the topic evolved throughout the research process. This influenced the development of the interview guide, meaning that certain questions were introduced later and could not be asked in earlier interviews. Similarly, relevant literature was identified at a later stage as the researchers' knowledge deepened, and therefore could not be incorporated into the earlier stages of data collection. This may have resulted in some inconsistencies in the data, as earlier interviews did not cover all themes explored in later ones. Consequently, certain perspectives may be underrepresented, and the comparability between interviews is somewhat limited.

Another limitation is that semi-structured interviews with open-ended questions, together with the relatively small number of municipalities interviewed, constrains the possibility of conducting a more extensive quantitative analysis. The number of data points is too limited to allow for statistically robust comparisons or to identify reliable relationships between variables. Furthermore, the nature of the questions means that responses some times are context-dependent and difficult to standardize, which further restricts the potential for quantification. The analysis was carried out as a comparative analysis of municipalities, focusing on identifying patterns and differences between them.

6

Conclusion

This study has investigated the need for inter-municipal collaboration in the Gothenburg metropolitan area. By interviewing municipal officials participating in the climate adaptation network lead by GR and officials from the Country Administrative Board of Västra Götaland and the Delegation for Göta älv, situations where there is a perceived need for inter-municipal collaboration have been identified. Barriers and enablers have also been identified, in these situations specifically, for inter-municipal collaboration more generally, and for the municipalities' internal work. This type of compilation has not previously been done for the Gothenburg metropolitan area and can be used to support the development of regional climate adaptation, while also contributing to the understanding of inter-municipal collaboration in climate adaptation.

Drainage basins are the situations in which the need for inter-municipal climate adaptation is most clearly identified, according to the interviewed municipal officials in this study. A shared willingness to collaborate within drainage basins, together with existing collaborations on related issues, may serve as important enablers for future inter-municipal climate adaptation efforts. However, several barriers remain, including limited geotechnical expertise within the municipalities, the high costs of adaptation measures, and the complexity of climate adaptation work, which requires a broad range of competencies to be included in collaborative processes. Although municipalities within the same drainage basin face different needs and challenges, these differences have not yet created major conflicts. However, they may become more challenging as climate adaptation efforts continue to develop. This study also concludes that the development of internal municipal climate adaptation work is crucial, both for identifying where collaboration is needed and for enabling municipalities to participate in collaborations that extend beyond knowledge sharing. Barriers to such work were identified as including political prioritization, external dependencies, resource limitations, and other institutional and organizational challenges.

Comparisons between the interview responses further indicate that the geographical conditions of a municipality have a significant impact on the perceived need for collaboration. As mentioned, shared drainage basins were identified as particularly important areas for collaboration, whereas shared coastal areas or forest areas were not perceived as generating the same level of need. In addition, the extent to which municipalities had developed their internal climate adaptation work also appeared to influence the barriers they experienced.

Finally, the interview results suggest that several factors are important when designing future collaborations. Building resilience within collaborations is essential for ensuring long-term continuity, and including the right actors with appropriate knowledge and decision-making mandates is another important factor. The findings also highlight the importance of incorporating an objective third party into collaborative processes. At the same time, working with diverse groups increases the need to establish a common understanding and shared visions for the future.

This study has been based on information from a selection of municipal officials, all working with climate adaptation. To investigate this topic further, future research could include other perspectives from within the municipalities to develop a more comprehensive understanding of the issue. Something that emerged during this study was whether existing inter-municipal collaboration within other domains, such as emergency services, could be studied to determine whether their working methods could be applied to future climate adaptation efforts. Due to the time limitations of this project and the complexity of the task, this was not explored further. However, it could be investigated in future research. Lastly, this study has compiled perceived barriers. The strength of these barriers in relation to each other as well as an actually quantitative study of how many municipalities experience each barrier could be investigated further.

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A

Appendix A: Interview Guide - Municipalities

The following themes and questions constitute the interview guide for the interviews with the municipal officials. This was used as a starting point and was then modified for each individual municipal interview to adapt the questions to the municipality's challenges and conditions. Due to the anonymization of the interviewed municipalities, the specific interview guides can not be presented in the report. The interviews were held in Swedish, here the interview guide is translated to English.

Role, responsibilities and internal organization

- Could you briefly describe your role within the municipality and how climate adaptation work is organized in your organization?
- Is climate adaptation part of your job description, and approximately how much of your position is devoted to this work?

Climate risks and the municipality's current situation

- If specific hazards that the municipality is working with were identified in the material that was reviewed beforehand: We understand that X and Y are the key risks you are addressing - is this correct, or are we missing anything?
  If we have not identified which hazards the municipality prioritizes: Which climate-related risks would you say are the highest priorities for the municipality to address today?
- Would you say that your municipality is primarily in the mapping/assessment phase, the planning phase, or the implementation phase?
- Are there any planned or already implemented physical adaptation measures?

Current inter-municipal cooperation

- How does your cooperation with other municipalities currently work when it comes to climate adaptation?
- Do you have insight into adaptation measures planned by other municipalities, and how important is that overview for your work?

Situations where expanded collaboration is needed

- We are particularly interested in identifying specific challenges you face that will require inter-municipal collaboration to address. Can you provide some concrete examples of situations where effective climate adaptation clearly requires collaboration across municipal boundaries?
- Who do you need to collaborate more closely with in these situations?
- Are there measures taken in other municipalities that affect your municipality?

Barriers, uncertainties and conditions for collaboration

- What do you see as the biggest barriers to inter-municipal collaboration on climate adaptation?
- Who should take the initiative for such collaboration (e.g. politicians or municipal officials)?
- What would be needed to make this type of collaboration work or get started?

Organization, support and future roles

- How should collaboration between municipalities be organized going forward - more directly between municipalities or through a more formal organization?
- Are there existing actors that could take a leading or coordinating role (e.g., GR, water councils, or similar bodies)?

Political prioritization and governance

- How do you perceive the political prioritization of climate adaptation within the municipality?

Final reflection

- Is there anything important regarding inter-municipal climate adaptation that we have not discussed but that you think is relevant?

B

Appendix B: Interview Guide - County Administrative Board of Västra Götaland

The following questions constitute the interview guide for the interview with the official from the County Administrative Board of Västra Götaland. The interview was held in Swedish and the questions are here translated.

Role and responsibilities

- Could you briefly describe your role at the County Administrative Board and how you work with climate adaptation?
- How is the climate adaptation work organized at the County Administrative Board?

The County Administrative Board's role

- What is the County Administrative Board's role in climate adaptation?
- What is the County Administrative Board's role in inter-municipal collaborations about climate adaptation?

Climate-related hazards

- Which climate-related hazards does the County Administrative Board work with?

Inter-municipal collaboration

- Does the County Administrative Board see situations where municipalities should collaborate more closely in order to achieve effective adaptation measures?
- Can the County Administrative Board do anything to facilitate collaboration in these situations?

Barriers and challenges

- What do you see as the main barriers to climate adaptation work? For the County Administrative Board, municipalities, inter-municipal collaboration?
- How is your work affected by government appropriation directions (regleringsbrev)? For example, does it affect long-term planning or how you can support the municipalities?

Guidelines

- How do you handle different guidelines, scenarios and information/documentation?
- Do you know why different governmental agencies use different scenarios, risk factors, etc? Is it a challenge/problem that they use different?

Other county administrative boards

- Do you collaborate with other county administrative boards on climate adaptation?
- Are there differences in how you and other county administrative boards work with climate adaptation - both internally and in your support to municipalities?
- The County Administrative Board of Västra Götaland covers a large geographic area and population, but has particularly a high number of municipalities compared with other counties. Does this affect your climate adaptation work, and if so, how?

Cooperation with municipal associations

- How does cooperation between municipal associations and the County Administrative Board work in relation to climate adaptation?
- Does climate adaptation work differ between counties that have municipal associations and those that do not?

Final reflection

- Is there anything important regarding inter-municipal climate adaptation that we have not discussed but that you think is relevant?

C

Appendix C: Interview Guide - Delegation for Göta älv

These are the questions that constituted the interview guide for the interview with the official from the Delegation for Göta älv.

- What do you work with, and what is your role in the Delegation for Göta älv?
- What is the Delegation's assignment, and how do you carry it out?
- What are the biggest challenges associated with Göta älv?
- Which stakeholders are represented in the Delegation, and what areas of expertise are included?
- What types of decisions are made within the Delegation?
- How are the measures financed? Are all measures funded through government grants, or are there other forms of financing?
- Do you primarily work with current risks, or also with future risks related to climate change?
- Do you work solely on managing landslides, or also on factors and risks that influence the likelihood of landslides?
- How local are the landslide risks, and to what extent do you need to work from a broader, holistic perspective?
- Which interests are at risk of being affected by a landslide or slope failure? How are priorities made between different interests?
- Are there conflicts between objectives that affect climate adaptation measures, and if so how are these managed?
- How are Göta älv and the municipalities affected by the storm surge barriers? How involved are you in the work related to the storm surge barriers?
- How does cooperation between the municipalities within the Delegation work?
- What barriers or challenges complicate the Delegation's work on climate adaptation?
- Do you observe any barriers to the municipalities' climate adaptation efforts?
- How is the work on geotechnical investigations divided between the municipalities and the Swedish Geotechnical Institute (SGI)?
- Do you see a need to expand the Delegation's assignment?
- Is there anything important regarding inter-municipal climate adaptation that we have not discussed but that you think is relevant?

DEPARTMENT OF ARCHITECTURE AND CIVIL ENGINEERING
CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden
www.chalmers.se

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