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# Governing risk society

Institutional conditions for local adaptive capacity  
to climate change in Norway, Sweden and Germany

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# **Governing risk society**

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# **Governing risk society**

**Institutional conditions for local adaptive capacity to climate change in Norway, Sweden and Germany**

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# Preface

In this report, NIBR-HiOA, NIVA and NVE, in collaboration with the University of Luleå, University of Gothenburg (Sweden) and InterSus (Germany), present the institutional framework for local climate change adaptation in Norway, Germany and Sweden. The aim of the report is to be a basis for our further discussion of which institutional conditions that stimulate local adaptive capacity-building, and identify what factors that seems to represent challenges and hindrances for developing adaptive capacity to climate change. The report is part of the dissemination from the research project “Governing risk society: Increasing local adaptive capacity by planning and learning networks (GOVRISK)”. GOVRISK studies how planning and learning networks can increase local adaptive capacity dealing with the effects of climate change focus particularly on flooding and landslides. GOVRISK will contribute with new knowledge on climate adaptive capacity of local authorities in a situation where the certainty of scientific knowledge has been strengthened on a general level.

NIBR, May 2017

Trine Myrvold,  
Research Director

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# Summary

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## **Governing risk society. Institutional conditions for local adaptive capacity to climate change in Norway, Sweden and Germany**

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The institutional context of the processes of translation and transmission of climate knowledge between social levels and actors is a crucial factor that condition uptake of climate information and knowledge in local planning. Being a relatively new policy field, although adapting to local climate have always been an important part of local development, it is interesting to see how different countries have organised the tasks and responsibilities related to the policy field.

The institutional context is also of utmost importance when comparing different systems as it gives understanding of similarities and differences across cases. We will concentrate the institutional comparison on Germany, Sweden and Norway's system of government; the allocation of climate adaptation responsibility; the level of local autonomy in each country; and relevant planning levels and planning tools.

### **System of government**

Germany is a federal republic with a parliamentary system of political representation at four tiers (federal government-regional states-districts-municipalities), while Sweden and Norway are three-tiered unitary states (state-region-municipality), all popularly elected. As a federal state, Germany put strong emphasis on the subsidiary principle.

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The German subsidiary principle states that governance challenges or political decisions should be dealt with at the most immediate (or local) level consistent with their solution, i.e. as local as possible. The German constitution guarantees municipalities the right to independent self-government (Article 28), which reflects the subsidiary principle. This leads to a politico-administrative system in which the responsibility to decide about concrete investments or implement "measures" resides mostly with the local level (the *Gemeinden*), and municipalities cannot be forced into implementing a certain measure (which is called the "principle of voluntary implementation", or „Freiwilligkeitsprinzip“). However, municipalities operate within a strong economic, political and administrative system, requiring the cooperation of all levels of government.

The autonomy of Swedish municipalities are, as their German counterparts, secured in the Swedish constitution. This is not the case in Norway. But in practice, the position of Swedish and Norwegian municipalities within the political-administrative system is similar. However, as unitary states with long traditions of state rule, Swedish and Norwegian municipalities do not operate according to a principle of voluntary implementation. Rather they reside in a system with continuous tension between being implementers of national policies and independent policy-makers. However, the two countries have a history of strong local government involvement in public policy and administration. The municipalities is the most important welfare providers, social developers and plan authorities.

### ***Distribution of climate change adaptation authority and responsibility***

In all countries, the local level has the main responsibility for local climate change adaptation. Neither are there one dedicated national authority devoted to climate adaptation in the three countries. Rather, there are several national authorities (Agencies) engaged in climate adaptation. Thus, this represent a challenge to be able to formulate a coordinated and comprehensive adaptation policy. This challenge has been taken into account in Norway, and now the Norwegian Environmental Agency (and the Ministry of the Environment) has the overall *coordinating* responsibility,

coordinating the many Ministries and agencies having specific responsibilities for different tasks.

In Norway, the distribution of responsibility for climate change adaptation follow the traditional “sector-responsibility-principle for taking environmental concerns” (Hanssen, Hovik and Hundere 2014). This implies that individual sector authorities all have the responsibility of adapting to climate change in their sector. However, some national authorities are responsible for creating necessary framework (the Agencies of NVE<sup>1</sup>, DSB, and the Ministry of Environment has coordinating role (supported by the Norwegian Environment agency). Yet there is a strong emphasis on the municipalities' role as responsible organ for executing adaptation efforts.

Germany also follow that subsidiarity principle, and municipalities are considered important for taking measures and decisions relating to climate adaptation. National action plan (2011) involving federal ministries, Länder (regional level) and non-state actors (commercial sector). Federal level responsible for funding research, and also provides financial support for adaptation efforts in municipalities. Furthermore, standards and legal norms are adjusted to support and accommodate adaptation on local level. Municipalities are responsible for task both due to transferred authority, and self-government. Adaptation is part of both categories – e.g. through construction supervision (transferred), and land use planning (self-government). However, there is no direct legal mandate to consider climate adaptation in these tasks.

On national level, environment ministry and agency coordinates cooperating between Länder – somewhat similar to the role of the corresponding Norwegian ministry and agency. In contrast to Norway, there are several permanent cross-departmental working groups and a standing committee. Federal and regional governments are responsible for creating conditions for local adaptation – both by municipalities, but also companies and individuals, for instance through (lack of) insurance options or disaster relief.

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<sup>1</sup> NVE - The Norwegian Water Resources and Energy Directorate  
DSB - The Norwegian Directorate for Civil Protection

In Sweden, the responsibility for local adaptation are split between the three tiers of government. At national level, several agencies and other actors have responsibility within their respective sectors. Among these are the Swedish meteorological Institute, SMHI, which runs a knowledge center for climate adaptation. No single entity has an overarching responsibility for measures and efforts. At regional level, the CAB (Länsstyrelse) are tasked with coordinating the efforts within the region. Still, the main decisions about measures and implementations are left to the municipalities. The responsibility for adaptation are linked to both comprehensive planning, land use, preparedness and contingency and technical infrastructure. As a sidenote, owners of private property are also expected to make adequate precautionary measures.

Comparing these three countries, there are several dimensions that can be stressed. Firstly, Sweden and Norway seem to have a similar structure at the national level: Several agencies operate within their sector, and one agency has a coordinating role. However, they lack the interdepartmental working groups established in Germany. This indicates a rather fragmented national responsibility in climate change adaptation in Norway and Sweden.

Secondly, all three countries emphasize the key role played by the municipalities in operationalizing and implementing climate adaptation policies and measures. All countries have placed a lot of responsibility on the municipalities. An important discussion is that of necessary competence. Even if the municipalities have the responsibility and authority (plan) over this complex task, the question is if they have enough relevant competence to be able to integrate the adaptation concern in their planning and priority of measures. In Norway, the most offensive and vulnerable municipalities have recruited geologists (among them Bergen). But few municipalities have the resources needed to do the same.

Thirdly, the role of the regional level differ. Swedish regional authorities seem to have a stronger responsibility than their Norwegian and German counterparts. However, also the German planning regions (114) have an important role, as they are formulating the legally binding regional plans.

## Planning system

There are several important differences in the planning systems of the different countries, which might influence the climate adaptation work.

In Norway, the highly autonomous municipalities are the formal land-use authorities formulating the mandatory legally binding land-use plans. The regional level is weaker, with voluntary regional plans which are not binding. The regional and national authorities can raise formal complaints (*innsigelse*) against plans in conflict with significant national and regional interests, but are now instructed to reduce the use of this tool (by national government).

In Sweden, the main planning authorities are the municipalities, with mandatory Master plans (*översiktsplan*) – including optional Detailed master plans (*fördjupad översiktsplan*). This seems similar to the Norwegian system, where the main plan is mandatory, but can be specified in more detailed plans. However, contrary to the Norwegian Master plan, the Swedish Master plan are not legally binding. Thus, it more closely resembles the German non-binding Preparatory plans. Detailed development plans are used for areas being developed, and are legally binding. On regional level, planning is more sectoral (i.a. related to the WFD), but also some places handled by special Regional Planning Organizations. Such RPOs can for instance be established with the intention of coordinating the planning along a river. The Norwegian system has a somewhat comparable system, which is called inter-municipal planning cooperating. However, the Norwegian system does not produce separate plans, but rather coordinate relevant municipal plans.

In Germany, the planning system is described as vertically integrated, consensus-oriented system for spatial planning (referred to as a process of reciprocal influence "Gegenstromprinzip"). Higher levels provide guidelines within which lower levels make detailed plans. The regional level (114 planning regions) have more authority than in Norway and Sweden. They have the authority to formulate "*Regionalplanung*", which aims at specifying and implementing the sectoral targets formulated at *Länder* level and integrating these into a comprehensive, legally binding planning

document, the *Regionalplan*<sup>2</sup> (also consisting of a textual and a map part). Thus, the regional level serves as a link between the *Länder* and local level planning (BMVBS 2010, Akademie für Raumforschung und Landesplanung 2005). At local level, there are two types of plans: non-binding preparatory plans (on a larger scale) and binding land-use plans (detailed) – parallel to Norway's master plans (*kommuneplanens arealdel*) and zoning plans (*reguleringsplan*). There also exist different sectoral plans (*Fachpläne*) for transportation, utilities etc) which seems related to the Norwegian societal part of municipal plans (parallel to *tematisk kommunedelplan*) – these provide input to the spatial planning.

### **What are the implications for the ability of integrating climate change adaptation concerns?**

In comparing the institutional framework in the different countries, is to have a multi-level perspective on the planning systems when discussing the ability to integrate a cross-sector perspective as climate change adaptation concerns. What is most interesting, is the role of *the regional level*. The regional level in Germany, the level of juridical binding *Regionalplanung*, is considered to be the most relevant governance level for coordination and mediation between different (and diverging) sectoral planning interests, is crucial. Here, there is an explicit focus upon themes relevant for climate change adaptation. Climate change issues - mitigation as well as adaptation - are being introduced into spatial planning in many different ways, both directly (i.e. implicitly under the "headline" climate change) and indirectly (i.e. through existing topics, such as flood protection, renewable energies, biodiversity protection etc.).

In Norway, the regional plans are not legally binding in the same ways. Neither do all regional plans have a spatial dimension, since the PBA 2008 do not require any plans besides a regional planning strategy. The regions (county municipalities) that choose to have a "land-use and transport plan" often have a strong co2-reduction focus (densification, transport-oriented, traffic hubs), they to a very little degree have a focus upon adaptation themes. This is also the critic from EU of the new regional water management plans in

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<sup>2</sup> Depending on the *Bundesland* and the region, the *Regionalplan* is sometimes also called "regional development plan" or "regional spatial planning program".



Norway, that they to a little extent integrate the effects of climate change upon the ecological status of water (according to the EU Water Framework Directive) (Hanssen et al 2015, Barkved and Hanssen 2015). Different studies from Norway all points to the potential of the regional level of taking a more coordinating role in climate adaptation, a potential which is not used today (Hanssen et al 2013, Hanssen et al 2012, Dannevig and Aall 2015, Hanssen and Hofstad 2017). One of the explanations is that the planning system does not allow for strong guidance by regional plans, as they are not legally binding upon the land-use of municipalities. Thus, the regional level has lower legitimacy of formulating strict guiding principles for municipal land-use. This is a dilemma in ensuring climate adaptation concerns, as the effects of climate change is often natural hazards that cross municipal borders. However, this does not fully explain why the regional level in Norway have not integrated climate change adaptation more in their plans.

In Sweden, the planning system allows for more hybridity, as most regional plans are not legally binding, while some are.

Thus, while regional planning is crucial for climate adaptation in Germany through the binding regional plan. In Norway and Sweden, the local level is most important. In Norway, the municipalities are highly autonomous in land-use planning, with some formal guidelines and regional and national authorities can raise formal complaints (*innsigelse*) against plans in conflict with significant interests. While Norwegian municipalities can develop legally binding land use plan that covers all the municipal territory, German and Swedish municipalities can make judicially binding land-use/zoning plans for *parts* of the municipality.

The fact that Norwegian municipalities can make legally binding land use plans that covers all the municipal territory can strengthen the municipalities' ability to have a comprehensive adaptation perspective on their land-use. However, we see from our survey that only half of the municipalities under 20 000 inhabitants report they have integrated it in their land-use plans, while 77 percent of larger municipalities report the same (see Hanssen, Hofstad and Winsvold 2017).

The aim of the report is to be a basis for our further discussion of which institutional conditions that stimulate local adaptive capacity-building, and identify what factors that seems to represent

challenges and hindrances for developing adaptive capacity to climate change.

# 1 Introduction: Governing risk society

There is now a broad acceptance that society is vulnerable to climate change and variability (IPCC 2014, Amundsen *et al.* 2010). Climate change adaptation can be defined as adjustment of natural or human systems in response to actual or expected climatic stimuli or effects, which moderates harm or exploits beneficial opportunities. Hence, there is a need for developing resilient societies, integrating ecosystems and social systems to be robust and able to achieve balance after external disturbances (Berkes *et al.* 2003, Adger *et al.* 2007, Shaw & Theobald 2011). Within this framework, climate adaptation concerns must be integrated in all policy-fields and all phases of risk management, due to the wide range of effects (Hauge *et al.* 2017, Harvold *et al.* 2010, Poser & Dransch 2010). Being modern welfare states, Sweden, Norway and Germany has well-functioning public institutional structure and service delivery apparatus, thus having a good potential to develop resilient societies with high climate adaptive capacity. Following the tradition of strong local government, this level has gained the main responsibility for climate adaptation. National authorities increasingly stress that climate change effects must be taken into account in local planning and decision-making. However, empirical studies show a lack of systematic climate adaptation work at local level. The work that is done is often a reaction to experiences of natural hazards (Dannevig *et al.* 2012, 2015, Kellman 2011, Orderud and Naustdalslid 2017, Multiconsult 2017). Earlier studies point at several factors explaining this; conflicting objectives, budgetary constraints, lack of competence, inadequate size, and two important challenges have been stressed; the translation challenge and coordination challenge (O'Brien *et al.* 2006, Næss *et al.* 2005, Hovelsrud & Smit 2012, Inderberg 2011, Aall 2012, Wejs

et al 2014, Dannevig et al. 2015, Orderud and Naustdalslid 2017). The translation challenge describes the lack of information in understandable format, combined with a lack of translation capacity at local level (Corfee-Morlot et al. 2011). Climate projections have an inherent uncertainty that local authorities find hard to handle in their daily work, and they find it hard to translate scientific knowledge into adequate politics making local society more resilient (Hinkel 2011, Orderud & Winsvold 2013, Orderud and Naustdalslid 2017, Multiconsult 2017). The lack of fine-tuned knowledge seems to reduce the awareness of climate changes in identifying risk, the willingness to integrate climate-related knowledge into land use- and emergency planning, and the political willingness to take measures. *The coordination challenge* describes the situation having a fragmented landscape of governmental actors at local, regional and national level with climate adaptation responsibilities. This requires multi-level coordination of knowledge and authority, but recent research identifies lack of coordination between sector-authorities at all governmental levels; between public and private actors; and between municipalities having a better “spatial fit” to meet the increased risks (Björnberg & Hansson 2011, Hanssen *et al.* 2012, 2013, Moss 2012, Rykkja 2010). Even if national authorities, for example in Norway, now stress that climate adaptation concerns must be taken into account locally, municipalities have a huge leeway. Legislation and regulation are scarce, vague and fragmented, and traditional steering is regarded as unsuitable as local context is so important for developing suitable strategies. In the absence, *planning* and *learning networks* gain importance as translation- and coordination instruments, being a special focus in GOVRISK. *Planning*, especially spatial planning as regional -, municipal- and detailed plans, are now expected to be important coordination instruments for ensuring robust climate adaptation (Meld. St.nr.33, 2012-2013). Planning needs to include uncertainty, ambiguity and risk as definitional properties caused by a changing climate, following an adaptive planning-ideal (cf. adaptive governance, Termeer *et al.* 2010). Here, obtaining local knowledge from citizens, NGOs and private stakeholder are of utter importance to understand how local societies are vulnerable to climate effects. Adaptive planning also stresses the importance of cross-level, cross-sector and cross-scale interaction (Folke *et al.* 2005). Spatial planning in Norway faces an extra challenge in

ensuring this, as NPM- reforms have given private developers important roles as plan-initiators and -formulators. In order to meet the *translation challenge* between scientific research and local context in climate adaptation, partnerships and networks between public, private and civil society actors are identified as success factors (O'Brien *et al.* 2006). In Norway, local and national authorities now ask for such meeting arenas, but few tailor-made arenas exist (Sanderud & Lea 2013, Orderud and Naustdalslid 2017). Some municipalities are actively using other networks as information-, translation- and deliberation arenas for climate adaptation issues (Hanssen *et al.* 2013), thus functioning as *learning network*. Learning networks can contribute to overcome departmentalization, silo-thinking and lack of communication and coordination. They are partly a response to low scale of fit between the problems and responsible authority (Moss 2012), as they often expand municipal borders. The democratic dimension is also an important aspect of local climate adaptation, as elected local councils are final decision-makers. Research shows that they to a varying degree are informed or included in the work (Orderud 2011). Hence, there is a need for research on if and how politicians (and citizens) are given the opportunity to choose which level of risk they are willing to live with, or how much resources to be used to reduce it (and to be taken from other parts of the municipal budget).

The research project “Governing risk society: Increasing local adaptive capacity by planning and learning networks” (GOVRISK), funded by the Norwegian Research Council (KLIMAFORSK-programme), addresses these three challenges. Our point of departure is that institutional conditions affects how new policy-fields as climate change adaptation is incorporated into local politics and implemented. Climate change adaptation is here delineated to how municipalities adapt to a situation with increased risks for natural hazards caused by flooding and avalanches.

In this research-report we present the institutional framework for local climate change adaptation in Norway, Germany and Sweden. Being a relatively new policy field, although adapting to local climate have always been an important part of local development, it is interesting to see how different countries have organised the tasks and responsibilities related to the policy field. The aim of the report is to be a basis for our further discussion of which

institutional conditions that stimulate local adaptive capacity-building, and identify what factors that seems to represent challenges and hindrances for developing adaptive capacity to climate change.

## 2 Institutional conditions for local adaptation to climate change in Norway

*Line Barkeved, Gro Sandkjær Hanssen, Hege Hisdal, Hege Hofstad, Eivind Junker and Isabel Seifert-Dähnn*

### 2.1 In a nutshell: the Norwegian climate change adaptation policy

In Norway, the Ministry of Climate and Environment, has the overall responsibility to co-ordinate climate change adaptation. However, the responsibility to assess climate change vulnerability, adaptation needs and to implement adaptation in practice is the responsibility of the individual sectors. The administrative flood and landslide management structures has three levels: national, regional (county) and local (municipality). In principle, each actor is responsible for obtaining necessary knowledge and information to fulfil its duties. However, the Norwegian Water Resources and Energy Directorate (NVE) is designated as the national authority for preventing damages caused by floods and landslides. This involves tasks related to hazard mapping; land use planning; flood and landslide protection measures; national flood, landslide and avalanche warnings; assisting municipalities in flood and landslide emergency preparedness; and to have a focus on R&D related to the effect of climate change on floods and landslides. NVE has its own regional offices and therefore acts as both the national and the regional level authority. In practice, this means that NVE is responsible for giving advice to the municipalities on how to reduce flood and landslide risks both in the present and future climate.

In addition, at the regional level, the land use planning in general is supported by the county municipality and the county governor (regional state authority). Related to floods and landslides, there is a close collaboration between NVE, the county governor and the county administrative unit. The governor is responsible for communicating and enforcing national guidelines for land use planning, for coordinating work on protection and preparedness in regions and cooperation with municipalities (local level). The county administration is the regional planning authority. The county administrative unit has a general responsibility for regional planning and its consistency with political objectives for economic, social and cultural development. They should also ensure that the municipalities receive guidance and assistance in their planning tasks. The responsibilities of the county governor are different in that it is a controlling body for national policy implementation in municipalities and coordinates national government policy with municipalities.

The combination of land use planning, civil protection and the authority giving building permits provides municipalities with a good foundation for meeting their responsibility for local adaptation. The local level land use planning is the most important tool for adaptation that can ensure long-term, robust and sustainable development and management of land and the natural environment in the municipality. Municipalities are obliged to assess the need for review of their plans every four years, through the municipal planning strategy. The planning strategy process should provide pathways of behaviour and knowledge on possible improvements. An essential principle of strategy planning for municipalities is the adaptation of developed guidelines – renewed master plans for future land use and future social development. Master plans include land use plans, plans for social developments and the legal description of land use planning and management in accordance with Norwegian Law.

After giving permits, the municipalities are required to check that measures are implemented in compliance with permits and applicable laws and regulations. Through their inspection activities, the municipalities have the opportunity to discover and pursue breaches of regulations that may subsequently lead to flood and landslide damage. The municipality may choose to audit all



building activities and in compliance with the building application regulations, prepare a strategy for the control work.

Hydrological projections for floods in Norway under a future climate (Lawrence, 2016; Hanssen-Bauer et al., 2015), show that increasing temperatures and changes in precipitation will alter the flood regimes. Ensemble modelling based on locally-adjusted precipitation and temperature data from several regional climate scenarios in conjunction with multiple hydrological models for 115 individual catchments is used to assess likely changes in river floods. Spring snowmelt floods are expected to decrease in the major rivers where snowmelt is the dominant flood generation process. In rivers currently dominated by rainfall floods, floods are expected to increase in the future. In particular, smaller tributaries will yield more frequent rapid, flash flooding caused by localised cells of intense precipitation.

Climate and hydrological projections are inherently associated with uncertainty. However, despite differences in the magnitude of projected changes, the direction of changes in climate and hydrology are clear. An important part of an adaptation strategy, in fact, is an assessment of how this uncertainty should be taken into account. Due to the uncertainties in the projections for individual catchments and to the need to generalise the results to areas outside the calibrated catchments, a pragmatic solution has been to propose three categories for use in climate change adaptation: no change, 20 % increase and 40 % increase.

This “climate factor” information is included in the Norwegian flood inundation maps that are a combination of flood hazard and flood risk maps. Inundation maps in Norway contain the extent of flooded area with a certain probability of flood occurrence (in our example 0,5%, i.e. area that will be flooded by a 200-year flood), and the value of a depth of water on flooded area. The classes of water depth are classified for each 0,5 m, up to 2 m depth. Norwegian maps also include the buildings that only will have water in the basement and buildings prone to severe damages from floods.

Landslides and avalanches in particular occur in steep terrain. An exception is quick clay slides in lower lying areas below the marine limit. We distinguish between snow avalanches, earth slides and rockslides. Depending on the water content in the snow, we

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separate avalanches into dry snow avalanches, wet snow avalanches and slush slides. Earth slides also comprise flood slides.

In particular, snow avalanches and earth slides are triggered by weather conditions. Changes in temperature, precipitation and wind can cause high snow avalanche probabilities. Earth slides in steep terrain can be triggered by heavy rain and/or snowmelt. Quick clay slides are normally triggered by human activity, but can also be influenced by floods and erosion in creeks and rivers. Smaller rock falls can be triggered by freezing and thawing, whereas the large rockslides rarely can be related to the weather. Because weather triggers particular types of slides and avalanches, climate change will influence their frequency (Jaedicke et al., 2008; NGI, 2013). Climate change therefore makes risk mapping of landslides increasingly important. However, it is not assumed that the large, rare landslides will hit a larger area and an additional “climate factor” added to the strict risk categories already defined in the planning and building act is not seen as relevant.

## 2.2 Background: three tiers of government

The Norwegian three-tier system is characterized by a strong unitary state, a strong, highly autonomous local level (municipalities) (Baldersheim 2001, Mydske 2006) and a relatively weak regional level (counties led by directly elected councils).

Table 2.1: *The Norwegian Governmental Structure (\*Popularly elected)*

<b>The Norwegian three-tier governmental structure</b>			
<b>State</b>		<b>19 Counties</b>	<b>428 Municipalities</b>
<b>National</b>	Parliament* Cabinet Government Offices, central authorities		
<b>Regional</b>	18 County Governors ( <i>Fylkesmann</i> ) (The regional arm of the state)	19 County Councils* ( <i>fylkesting</i> ) County Council Boards ( <i>fylkesutvalg/fylkesråd</i> ) Regional Sector Administrations (Health, collective transport, culture)	
<b>Local</b>	Local Centres of Central Authorities (example: The police, Tax office)		428 Municipal Council* Municipal Council Executive Committee ( <i>formannskapet</i> ) Local Sector Administrations (e.g., Planning Office)

The national tasks and services are being implemented by a national administrative (sectorized) structure at regional level, existing parallel with the elected regional level, the counties. The most important regional state authorities for the policy field of climate change adaptation linked to floods and landslides are the County Governor (*Fylkesmannen*), the Norwegian Water Resources and Energy Directorate (Norges vassdrags- og energidirektorat, NVE), Norwegian Public Roads Administration (Statens vegvesen) and the Norwegian Railroad Authorities (Bane NOR). In some cases, the national administrative structure also has local offices (but are not being part of local government, the municipalities).

The traditional role of the elected regional level – the *19 counties* (county municipalities) – as a service provider has gradually decreased. Their most important tasks are: Upper secondary school, Regional development, County roads and public transport, Regional planning, Business development, Culture (museums, libraries, sports), Cultural heritage, Environmental issues. However, being bereft of significant portions of their task portfolio the last decades (hospitals, children care), the role of counties as coordinators and facilitators for a wide and complex policy field has been strengthened. For example, new planning instruments have strengthening them as planning authority. The strengthening of the counties as coordinating nodes is partly explained by the mushrooming of regional state authorities (now 40 in total, for example, the County Governor and Innovation Norway, see Hansen *et al.* 2007), which are regional offices of national sector authorities, ensuring sector interests by supervision and control of the local government.

The municipalities (local level) have much autonomy, and have increased their portfolios in the last decades. Their main tasks are: Primary and lower secondary school, Nurseries/kindergartens, Primary healthcare, Care for the elderly and disabled, social services, Local planning, agricultural issues, environmental issues, local roads, harbours, Water supply, sanitation and sewer, Culture and business development.

Many of the 428 municipalities are quite small, with an average of 10,400 inhabitants. There is currently a political process aiming to merge municipalities, and thus make them more suitable sizes for their tasks. However, national authorities have so far used incentives, seeking voluntary merges, rather than forcing them to happen.

There is also political effort to merge the counties – Norway's current government has indicated that ten regions are suitable.

## 2.3 Norwegian climate change adaptation policy

The Official Norwegian Report (NOU) on climate change adaptation defines the term as follows: “Adaptation to climate

change: Adjustments in biophysical or social systems that result from actual or expected climate effects to reduce damage or exploit opportunities.” This broad definition covers both current and future climate, and both negative and positive changes. Furthermore, adaptation actions can be exercised both in biophysical and social systems. Therefore, the definition can cover a wide range of topics and measures.

The primary responsibility for climate change adaptation is delegated to the municipal level, which has extensive autonomy in deciding the content in the adaptation policy (Harvold 2010). The argument for delegating the responsibility to the local level is that climate changes bring local variations and that it is at the local level that vulnerabilities unfold (Dannevig et al. 2012). Thus, the local level has the best knowledge of local effects and local needs and thereby the best authority level to develop an appropriate adaptation policy (IPCC 2007, NOU 2010:10).

In 2010, an Official Norwegian Report (NOU) about climate change adaptation was published. The report (NOU 2010:10 – Adapting to a changing climate) assessed Norway’s vulnerability to the effects of climate change, and the need to adapt. Following the NOU, the Government prepared a white paper (Meld.St. ) on climate change adaptation (Meld.St. 33 (2012-2013 – Climate change adaptation in Norway). It outlines actions to be taken at various governmental levels and within sectors in order to adapt to a changing climate. The white paper was discussed and adopted by the Storting (the Norwegian Parliament) in June 2013. In the meantime, the Storting also adopted a white paper on flood and landslide risk (Meld.St. 15 (2011-2012)), which dealt with reducing the damages caused by floods and landslides, including climate change adaptation. Also relevant, is the Official Norwegian Report about storm water runoff in cities and densely populated areas (NOU 2015:16). Climate change and urban flooding in a river basin perspective are core topics.

In the Official Norwegian Report on adaptation (NOU 2010:10), the committee that conducted the vulnerability assessment in the NOU 2010: 10 found that Norway is in a good position to adapt to climate change. However, future vulnerability will rely on to which extent climate change considerations is incorporated into planning and decision-making processes. Also, the committee

pointed out that the degree of vulnerability varies between different areas of society. Climate affect all sectors, but in different ways, with different intensity and on different timescales. In the report, exposure to climate change was assessed based on the climate projections for Norway ("Klima I Norge 2100", 2009), other research, and contributions from stakeholders. According to the report, natural environment, infrastructure and buildings, in particular water and sanitation, are particularly vulnerable to climate change in Norway. The exposure will vary between the coast and the interior parts, between Northern Norway and Southern Norway, and between steep, mountainous areas and low-lying, flat areas.

In summary, the NOU presented three broad principles which the committee thought should be applied to adaptation efforts a) A comprehensive approach to adaptation, b) Management of the natural environment must have an ecosystem-based approach, c) Adaptation must be integrated into the regular planning processes. Also, the report suggested seven general measures to be implemented:

- Climate change considerations must be given higher priority in the planning system.
- Increased uncertainty must be handled
- The knowledge base must be strengthened through studies, monitoring and research
- Capacity in the public administration must be enhanced
- Adaptation back-log must be rectified
- Coordination of the adaptation efforts must be improved
- The adaptation efforts must include an international responsibility

In addition to these ten main points, the committee recommended measures for various areas of society. However, the sector-specific proposals were not meant to be exhaustive, nor intended to replace the assessments to be undertaken within the sectors. Rather, the various measures should be seen as suggestions that

the committee believes should be given priority in order to improve the adaptive capacity within area in question.

The white paper on adaptation (Meld.St.33.2012-2013) was in large part based on the official report, although with a stronger emphasis on policy. Some of the key messages about exposure and vulnerability were repeated from the NOU. Also, more extreme weather events are expected – in line with those experienced several times in recent years. Insurance claims numbers show that storm water runoff is already causing a great deal of damage, and this is increasing, particularly in densely populated areas. Inhabitants may face risks different from what they are used to, and areas that have previously been viewed as safe may become more vulnerable. Norway's largest cities are located either at the coast or near lakes and rivers. The terrain may be steep. This make the cities exposed to natural hazards such as sea level rise and storm surges, river floods and different type of landslides. Infrastructure in urban areas – buildings, roads, railways, sewerage systems and other structures – will also be vulnerable due to more intense precipitation, leading to a higher probability of local flooding and landslides.

As a foundation for the further work with adaptation, the white paper discussed several principles, i.a. sectoral responsibility, use of best available knowledge, precautionary approach and the government's role as provider of a framework for adaptation. In practice, the specific tasks laid out by the white paper were to

- strengthen the knowledge base (by closer monitoring of climate change, increased climate change research, establishment of a Norwegian Centre for Climate Services and regular updates of knowledge)
- prepare and issue a Central government planning guidelines on adaptation
- evaluate the current legislation related to urban runoff/storm water management

These tasks are partly carried out – some of them are described a little more below, related to the roles of the different actors.

## 2.4 Shared responsibility for climate change adaptation: local level plays an important role

As laid out by the white paper, a fundamental principle of climate change adaptation in Norway is that any actor responsible for a task or function affected by climate change, also bears the responsibility for adaptation. In consequence, climate change is a shared responsibility. Individuals, businesses and industry and NGOs, as well as local, regional and national authorities, are required to integrate climate change considerations in their work.

The authorities are responsible for creating the necessary framework for others to adapt to a changing climate. This includes providing national statutes, regulations and guidelines. The municipalities play an important role in climate change adaptation, as a number of the challenges will be at a local level. Land-use planning is one of the core elements of this responsibility.

As described in the previous chapter, the municipalities have the overall responsibility for community development within their geographical borders. They have obligations and exercise authority under various sets of rules – among others, societal and land use planning regulated by the Planning and Building Act (2008). Municipalities are therefore required to use relevant and updated knowledge about present and future climate as a basis for their planning activities and exercise of authority.

The local authorities must also take climate change into account when applying the rules in PBA (2008) and TEK 10 (Technical regulation) of technical on the construction of housing, roads and other infrastructure (Junker, 2012). Climate change considerations are particularly important in the planning of new buildings and infrastructure that have a long operating time.

Climate change adaptation is not a policy field with strong and detailed national hierarchical steering. A national adaptation policy is in its infancy, as in many other European countries (Dannevig et al. 2012), and adaptation is not implemented in detail in the legislation – only as a broad aim (Aall et al. 2012). There are many acts and regulations regulating policy fields relevant for adaptation, but none of these explicitly state how climate change adaptation



should be dealt with at the municipal level. The PBA (2008) is one of the most important Acts, and here we find a requirement that municipalities have to conduct a risk and vulnerability assessment (RVA) for development plans. However, it is not explicitly required that these RVAs must contain consequences of future climate change. In addition, an RVA is just an assessment and will not necessarily result in action and measures (Dannevig et al. 2012). However, in the Technical regulation (TEK 10), chapter 7 "Protection against natural hazards" emphasises the need of taking climate change into consideration;

"The impact of climate change will affect the built environment, both for the location of buildings and for which loads the buildings can withstand. The Planning and Building Act with regulations shall contribute to adapting new buildings and structures to a changing climate.

Climate change can lead to frequent events of flooding and slipping and that they become more extreme. New knowledge of potential hazard areas and effects of climate change may result in areas previously considered sufficiently safe for buildings to no longer meet the requirements for safety in the Planning and Building Act and in Building Technology Regulations".

TEK 10 has a detailed description of acceptable flood and landslide risk divided into different categories for different types of buildings (for example 200 year-flood for ordinary houses and 1000-years flood for institutions as hospitals). However, TEK 10 is not explicitly stating how to relate to a changing climate, but is just stating that this has to be done.

Likewise, the Civil Protection Act requires that municipalities perform a so-called "comprehensive RVA" and formulate a contingency plan, but does not explicitly require these processes to take climate change into account (see DSB 2014 and Junker 2015). In sum, the municipalities' task is to consider climate change where relevant.

## 2.5 Shared responsibility for climate change adaptation: national level

Three national Agencies with important responsibilities for local climate change adaptation. In the fiscal budget proposal for 2014 it was announced that the Norwegian Environment Agency would, as of 1 January 2014, be the agency supporting the Ministry of Climate and Environment in its climate change adaptation work. The Environment Agency now has the responsibility for providing the ministry (and by extent, the nation) with scientific knowledge on which to base policy decisions. The Ministry of Climate and Environment will involve the Environment agency in developing further regulations and guidelines for planning (i.e. the Central guideline). Another important task is to provide information on government adaptation efforts and promote exchange of experience and network building, for example in developed a website, [klimatilpassing.no](http://klimatilpassing.no), including various examples of climate change adaptation in practice.

The Norwegian Directorate for Civil Protection (DSB) support the Ministry of Justice and Public security in coordinating civil protection and emergency planning efforts in Norway, in order to prevent or limit consequences of natural hazards. DSB work with climate change adaptation as an integral part of its work to reduce society's vulnerability as a whole. Like climate change adaptation, civil protection is a cross-cutting issue which covers all sectors and levels. Both civil protection and adaptation covers a broad scope of societal interests, and many principles, tools and mechanisms are to a large extent the same. The directorate also has a role in following up local level planning for disaster prevention through the Planning and Building Act, and for the overall work to reducing vulnerability at all levels through the Civil Protection Act. It has developed guidelines describing how climate change adaptation can be integrated in the various planning process (DSB, 2015). The County governor has the operative responsibility ensuring that the concerns of the Civil Protection Act (and DSB) are ensured in local planning.

The Norwegian Water Resources and Energy Directorate (NVE) has the national responsibility to prevent damages from floods, landslides and avalanches. This involves tasks related to hazard

mapping; land use planning; flood and landslide protection measures; national flood, landslide and avalanche warnings; assisting municipalities in flood and landslide emergency preparedness; and to have a focus on R&D related to the effect of climate change on floods and landslides. Climate change adaptation is integrated in these different tasks. Advice, requirements and measures with a short operating time is based on historical climate data. Climate and hydrological projections are applied to longer operating times.

Identifying hazard zones, avoiding developments in these zones, and protecting buildings and settlements at risk is a continuous process. This is described in detail in a 2012 white paper on floods, landslides and avalanches (Meld. St. 15 (2011– 2012) *Hvordan leve med farene – om flom og skred*, available in Norwegian only). In 2010, NVE prepared a strategy on climate change adaptation. A new strategy for the period 2015-2019 was published in 2015. This strategy includes a description of the need for research, an evaluation of climate change effects on the directorate's area of responsibility and a concrete plan for climate change adaptation.

Regardless of how the municipalities organize their adaptation efforts, knowledge of the local impacts of climate change will be essential. For example, without information about sea level rise, precipitation trends and the resulting changes in the risks associated with floods, landslides and avalanches, local authorities will not know which changes they need to adapt to.

NVE has prioritised hazard mapping based on assessments of risk and cost/benefit. A new plan for flood hazard mapping to clarify the priorities for initial mapping of new areas and for updating existing maps is being prepared and a landslide and avalanche hazard mapping plan has been published (Øydvin, 2011). Flood hazard mapping in flood-prone areas will continue and include so called climate factors to include the effect of climate change on floods. Landslide hazard mapping is also a continuous task and increasingly important because of climate change. All municipalities should map tributaries and streams where the damage potential is high. The observed and expected climate development in particular calls for measures to protect against landslides, floods and erosion in small, steep, mass-transporting rivers with a large potential for damages to be given greater

priority. NVE will as far as possible contribute to ensuring that climate change is considered in land use planning and the hazard maps are important tools in this context. Several guidelines have been published to ensure that sound uniform procedures are followed. Important are guidelines on how to consider flood, land slide and avalanche hazards in land use plans (NVE, 2011), guidelines on mapping of tributaries with a high damage potential (NVE, 2015), and guidelines linked to safety with respect to quick clay slides and landslides in steep terrain (Schanche and Davis Haugen, 2014; Schanche, 2014). How to consider climate change, i.e. climate change adaptation is integrated in the guidelines when relevant.

NVE has also developed a new cost/benefit tool including climate change adaptation to be applied when prioritising protection measures. If successful, it will be made publicly available.

In November 2012 the Norwegian Meteorological Institute (MET), NVE and Uni Research established a collaboration under the name “the Norwegian Centre for Climate Services (NCCS)”. In 2016 also the Bjerknnes Centre for Climate Research joined the collaboration. The centre is led by MET. In addition to the four partners, also the Norwegian Environment Agency is represented in the board. The main aim of the NCCS is to provide a basis for decisions on climate change adaptation in Norway, primarily by the estimation and dissemination of climate projections for Norway. The service is built on research that has a solid scientific foundation.

The first task of the centre was to update climate and hydrological projections for Norway base on the most recent global climate model results. Together with scientific knowledge about past and present climate and sea level change, the results are presented in the report “Climate in Norway 2100” (Hanssen-Bauer et al., 2015). The authors come from a variety of research institutions in Norway, not only those forming NCCS. The report itself and the results in the form of interactive maps are found at [www.klimaservicesenter.no](http://www.klimaservicesenter.no). Here you can also download historical climate data, information about historic and future climate variations and scientific and popular scientific publications.

NCCS aims at providing climate and hydrological data for use in climate change adaptation and further research about climate

change effects on nature and society. Based on Hanssen-Bauer et al. (2015) so-called climate profiles for the Norwegian counties are developed. They include information about climate change effects on hydrology including floods, and landslides and avalanches downscaled to the county or river basin level. The information can be used as a basis to include climate change adaptation in planning and the profiles are developed in close collaboration with county authorities and some municipalities. Climate profiles for all Norwegian counties will be finalised by April 2017.

The centre is developed in close dialogue with its users. A pilot project in Troms county, also involving the Directorate for Civil Protection, has developed and evaluated products that municipalities can use to incorporate climate change into their planning activities (DSB, 2015). Information technology plays an essential role in climate research. The use and development of ICT tools and products will be a key task for the centre.

In 2009 the Ministry of the Environment set up the website [www.klimatilpasning.no](http://www.klimatilpasning.no) to coordinate this type of information and make it easily accessible for regional and municipal authorities. The website, which is managed by the Norwegian Climate Adaptation Programme [now the Environment Agency], is also intended as a tool for municipalities and others who find it difficult to start on adaptation work, and contains a set of practical guidelines. These include background information, tools and advice on how to include climate change considerations in planning processes. There is a close collaboration and links between the two web-sites [klimatilpasning.no](http://klimatilpasning.no) and [klimaservicesenter.no](http://klimaservicesenter.no)

## 2.6 Network mechanisms

Until recently, the national government has to a lesser extent developed specific policies, guidelines or recommendations, or given financial support, to aid municipalities in their adaptation work. However, the national government has actively used network mechanisms to enable municipalities to adapt, by initiating a forum comprising the 13 largest cities in Norway called “Cities of the future”. The idea is that the exchange of experience, local knowledge and local solutions will coordinate the actions of

these cities as self-organized actors. The white paper describes the efforts as follows:

“In order to be of practical use in planning, knowledge about climate change adaptation must be further developed through collaboration between municipalities and resource centres that can interpret climate modelling and projections to provide locally adapted information. Networks and regional cooperation have been shown to be effective learning tools for strengthening the adaptive capacity of municipalities and enabling them to exchange experience. This is important in an area like climate change adaptation, which is new to many people and where experience is limited. Networked learning is also very effective. Cooperation with central government agencies, suppliers of climate projections and other knowledge centres can save municipalities time and money....”

Several types of networks for cooperation and sharing experience have been set up. While Cities of the Future involves the largest towns and their adjacent municipalities, regardless of geographical location, the networked learning for which the counties and county governors are responsible is linked to specific geographical regions. Both models have their strengths. Cities of the Future provides a forum for exchange of experience between urban areas on specifically urban problems, such as stormwater. The county networks link the municipalities within each regional administrative structure, which enables county authorities, county governors and key state agencies with a regional presence, such as the Norwegian Public Roads Administration and the Norwegian Water Resources and Energy Directorate, to provide clear and coordinated guidance to the municipalities. This form of cooperation also promotes intermunicipal collaboration on joint vulnerability assessments and regional challenges. The Government considers that intermunicipal cooperation will be an effective means of implementing central government guidelines on adaptation.

## 2.7 Insurance system

In Norway the natural hazard damage compensation system is organized in two pillars: private market natural hazard insurance

coupled to fire insurance and state compensation for all values, which can not be insured against fire and thus natural hazards.

The Norwegian Natural Hazards Insurance Act (Lov om naturskadeforsikring) determines that all buildings and movable property insured against fire are automatically also insured against natural hazards such as floods and landslides. Damages to buildings, contents, adjacent gardens and courtyards are covered (Proverbs and Brebbia, 2014). Insurance companies, which offer fire insurance and thus also natural hazard insurance, are mandatory members of the NNPP, the Norwegian Natural Perils Pool (Norsk Naturskadepool). The pool is administered by Finance Norway (Finans Norge), an umbrella organization for Norwegian banks, insurance companies and financial institutions. While the insurance companies adjust the damages of their policyholders, the aim of the pool is to equalize the losses between the companies. The premiums are not risk-based, but consist of a fixed percentage of the value insured, which is 0.007 per mill from 1.1.2012 .

Damages due to stormwater runoff (overvann) are only covered by the Natural Hazard Insurance Act if the water “digs wild creeks” at slopes and causes extraordinary damages . Other stormwater damages are not covered by the Act, but stormwater damages are often included in the building insurance. Damage to property of municipalities, county authorities (fylkeskommuner) or the state is not compensated by the NNPP.

The second pillar, the state compensation is regulated in the Natural Hazards Act/ Natural Disaster Compensation Law (Lov om erstatning for naturskader). The Norwegian National Fund for Natural Damage Assistance (Statens Naturskadefond) covers damages from natural hazard to properties, which can not be insured for fire damages and thus natural hazards. Insured properties under this act are for example privately owned roads and bridges, riverbanks, agricultural and forestry areas, wharfs and piers. The fund is administered by the Norwegian Agricultural Agency (Landbruksdirektoratet), which handles damage compensation . In 2014 a new Natural Disaster Compensation Law was approved by Parliament and will be put into force in January 2017.

In the last years the insurance industry observed an increasing trend of water related damages. Most of them were not caused by flood, but by water intrusion from the outside and rebound or stop of wastewater discharge. The insurance industry considers to claim recourse (kreve regress) from municipalities in case the wastewater collection system was not properly maintained or wrong dimensioned and thus led to the water damage.

(The Norwegian National Fund for Natural Damage Assistance (Statens Naturskadefond) was established with the aim to compensate damage caused by natural perils and to contribute to protective measures against such perils by the Act on Natural Damage of June 9th 1961. However, to avoid individual assessment of the risk and in order to provide adequate cover at reasonable premiums for those who were exposed to such risks, it was considered necessary to connect insurance against natural perils to an already existing form of insurance.

According to this it was proposed to make insurance against natural perils a compulsory part of all fire insurance of objects and property in Norway. It should be noted that insurance against natural perils has always been included in motor hull insurance, machinery insurance and other types of all risks insurance.

In compliance with the proposition of the committee, the Act on Natural Damage was amended June 8th 1979, and at the same time there were also amendments of the Act on Insurance Contracts. However, a special Act on Natural Perils Insurance of 16th June 1989 was put into force on 1st July 1990.

According to Article 1, in the Act on Natural Perils Insurance of 1989, insurance of objects against fire shall also comprise natural perils to the extent the damage is not covered by another insurance (e.g. motor hull insurance).



# 3 Institutional conditions for local adaptation to climate change in Germany

*Stephan Göerlitz, Eduard Interwies and Isabel Seifert*

## 3.1 Introduction

Climate change adaptation is a multi-dimensional policy challenge, which has to be integrated into laws, regulations and policies on different organizational levels. In Germany, being a federal republic with a complex mix of responsibilities and governmental tiers, it represents an additional challenge to understand how and where adaptation-related actions and responsibilities are situated, especially from the outside. The present GOVRISK Country-working paper aims at assisting the GOVRISK project partners from other countries in getting a better understanding of how the Germany political system, with a focus on climate change adaptation, works and functions.

As the German Case Study analyzed in the GOVRISK project treats the biggest city in North Rhine-Westphalia, Cologne, several examples provided throughout this document are from North Rhine-Westphalia or Cologne.

The overall trends for future climatic changes in Germany show an increase in temperature, an increase of annual rainfall, changes in the distribution of rainfall over the year and a higher frequency of extreme events, such as torrential rainfalls or heat waves. But these trends differ locally: While an increase in rainfall is expected mainly for Western Germany, in the Eastern parts an increase in winter

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precipitation is compensated by a decrease in summer rainfall. The expected temperature increase will be more pronounced in the South-West than in the North-East. Extreme events will increase everywhere.

In Cologne, the effects of climate change on "classic" flood events are not yet foreseeable, but it is suggested by studies that the risk of catastrophic events will probably decrease in the future. Nevertheless, climatic changes affect the city of Cologne in other ways: it is expected that torrential rainfalls will lead more often to short-term overloading of sewage networks, and the inner city will be more exposed to overheating.

Based on these findings, what does this mean for municipalities and its inhabitants? Rising temperatures and especially heat waves and dry spells can have a negative impact on building substance, traffic infrastructure and close-to-surface line infrastructures. The danger of pipe burst by soil subsidence increases due to more dry spells periods. In mixed water sewage systems, dry periods can decrease the hydraulic capacity of the system, due to missing flushing of the system. This might be compensated by artificial flushing or the use of chemicals but at higher maintenance costs. The drinking water provision can be negatively influenced e.g. by a decrease in raw water quality (e.g. due to toxic algae blooms), longer periods of high demand leading to shortage situations, enhanced by decreased recovery of groundwater bodies due to reduced infiltration into dried up soils. In summer a heating-up of buildings and roads in densely built areas in combination with insufficient air exchange leads to the formation of "heat islands", i.e. urban areas in which the temperatures are more elevated than in the surroundings. The heat stress in these areas can have negative health consequences for the population, but also impact urban greenery and local ecosystems in general.

An increase in the frequency of torrential rainfalls and strength and frequency of floods can without proper adaptation lead to higher economic damage and other impacts, such as infrastructure disruptions (e.g. traffic, electricity, sewage and drinking water). On the other hand climate change also has positive effects: In the tourist sector, less snow in mountain regions in winter will be negative for skiing, whereas warmer temperatures in the northern parts of Germany will probably be positive for summer tourism.

Agriculture will suffer from longer dry periods in summer and more flood events, but benefit from longer growing periods.

In the following, the German approach and policies towards adapting to these (negative or positive) future climatic changes are outlined, based on a description of how adaptation policies are anchored in the German administrative system.

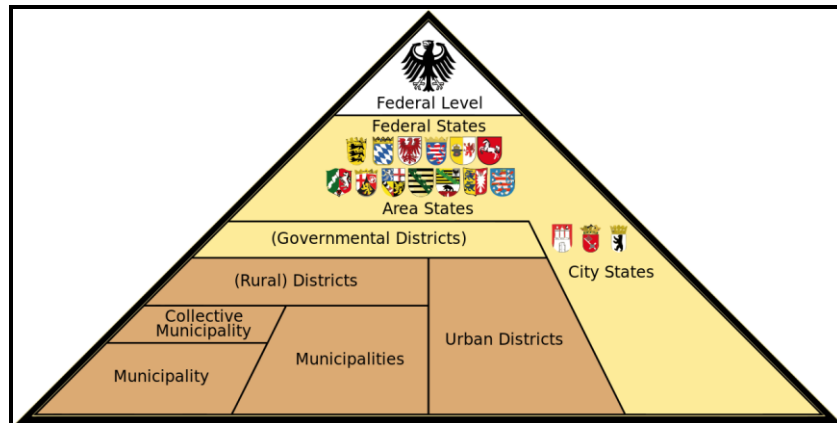
### 3.2 Short overall description of the political and administrative structure

Germany is a federal republic with a parliamentary system of political representation, with a strong emphasis on the subsidiary principle. Its main levels of governance and administration are:

- the municipalities ("Gemeinden"),
- the districts ("Kreise") and "district-free cities" ("Kreisfreie Städte")
- the federal (regional) states ("Bundesländer": "Flächenländer" and "Stadtstaaten") and
- the federal government (the "Bund").

The levels of governance and administration are depicted in the figure below:

Figure 3.1: *Levels of governance and administration in Germany (Luzzo 2006).*



Federal legislative power is vested in the Bundestag (the parliament of Germany) and the Bundesrat (the representative body of the Länder). The Länder themselves have Länder parliaments which are responsible for the part of the legislation assigned to their responsibility in the German constitution, the Grundgesetz. The Länder also have their own administrative systems, which makes up the biggest part of the administrative system in Germany, and which enforces the laws (also the federal laws) that apply in that Bundesland.

The subsidiary principle states that governance challenges or political decisions should be dealt with at the most immediate (or local) level consistent with their solution, i.e. as local as possible. The German constitution guarantees municipalities the right to independent self-government (Article 28), which reflects the subsidiary principle. This somehow contradicts the constitution's stipulation that it be possible to compare living conditions throughout Germany, which would require a more centralistic approach.

This leads to a politico-administrative system in which the responsibility to decide about concrete investments or implement "measures" resides mostly with the local level (the Gemeinden), and municipalities cannot be forced into implementing a certain measure (which is called the "principle of voluntary implementation", or „Freiwilligkeitsprinzip“). However, municipalities operate within a strong economic, political and

administrative system, requiring the cooperation of all levels of government. As such, decisions concerning e.g. land use, taxation and economic development often do not flow from the immediate jurisdiction, but often must function within a regional, state or national framework. The system also follows a strong hierarchical approach, and lower levels must not contradict decisions (mostly regarding planning) of the higher levels.

Hence, with regard to climate change adaptation as an example, the responsibility for implementing measures lies with the municipalities, and the higher levels cannot simply command the Gemeinde to do something. Nevertheless, there are examples in which the Bund and Länder are involved in implementing measures, e.g. co-financing infrastructure and flood protection, waterways of regional/national importance (maintenance/development), research (e.g. the Federal Environment Agency and its KomPass-Team) and information (e.g. Climate Service Center, Hamburg).

There is no dedicated, specific authority in Germany for dealing with climate change adaptation. However, Germany has a National Adaptation Strategy (Deutsche Anpassungsstrategie an den Klimawandel, DAS), which emphasizes the central role of local communities in climate change adaptation. The NAS furthermore recommends to include adaptation in assessment instruments (Strategic Environmental Assessments/Impact Assessments etc.), and makes reference to spatial planning activities to operationalize adaptation (see the following chapter).

### 3.3 Short description of the planning system

Spatial planning in Germany is organized through the vertically integrated (i.e. sharing responsibilities on different governance levels) and consensus-oriented institutional framework based on the decentralized decision-making structure described in section 2 (which is a manifestation of the principle of subsidiarity and Article 28 Grundgesetz). It is also based on a strong legal framework, assigning clear responsibilities to the individual actors (Brenner 1997, Schmidt/Bühler 2007).

The primary actors involved in the process are the federal government (Bund), the 16 state governments (Länder), the 114 planning regions and the approximately 14.000 municipalities (Gemeinden) (BBR 2000). In recent years, the European Union (EU) has also played an increasing, although indirect role, e.g. through the obligatory designation of "Areas of Potentially Significant Flood Risk" (APsFR) foreseen in the EU's "Floods Directive" .

In the vertically integrated and consensus-oriented institutional framework in which spatial planning is embedded, both the higher as well as the lower levels of governance work together in a "process of reciprocal influence" (Schmidt/Bühler 2007). In this process, the federal government does not create or implement plans, but rather sets the overall framework and policy structure to ensure basic consistency for state, regional and local planning. At the same time, the states, regions and especially the municipalities are the actual planning bodies. This process is called the "Gegenstromprinzip", meaning "counter-current principle" or "feedback principle": higher levels of governance provide the framework ("Leitlinien"), and the lower levels concretize the planning without contradicting the overall framework. Generally, the lower levels of planning (local planning) is referred to a Bauleitplanung (urban/rural development planning), whereas the higher levels, i.e. the levels on which guiding principles are being established, are referred to as Raumordnung (regional planning/regional development and country planning) (European Commission 1999, Turowsky 2002).

In the following, the different planning levels are shortly described and then depicted in a summarizing table (European Commission 1999, Turowsky 2002, BMVBS 2010, Greiving 2010).

### 3.3.1 Bund (Federal) Level

At the federal (Bund) level, very general regulations to guide spatial development policy are being designed, with the aim of ensuring that there is uniformity of spatial planning through legislation. This approach follows the overall objective of the constitution's stipulation that it be possible to compare living conditions throughout Germany (see chapter 2). For example, §2(6) of the federal Raumordnungsgesetz stipulates that planning has to respect

the spatial needs of climate protection (mitigation as well as adaptation), but does not specify further how this should happen.

In addition, the federal government publishes an informal, non-binding federal spatial planning review, which influences all planning levels through the use of information, statistics and projections, and defines key issues and goals (e.g. sustainable development) to be addressed (Akademie für Raumforschung und Landesplanung 2005).

### 3.3.2 Länder (State) Level

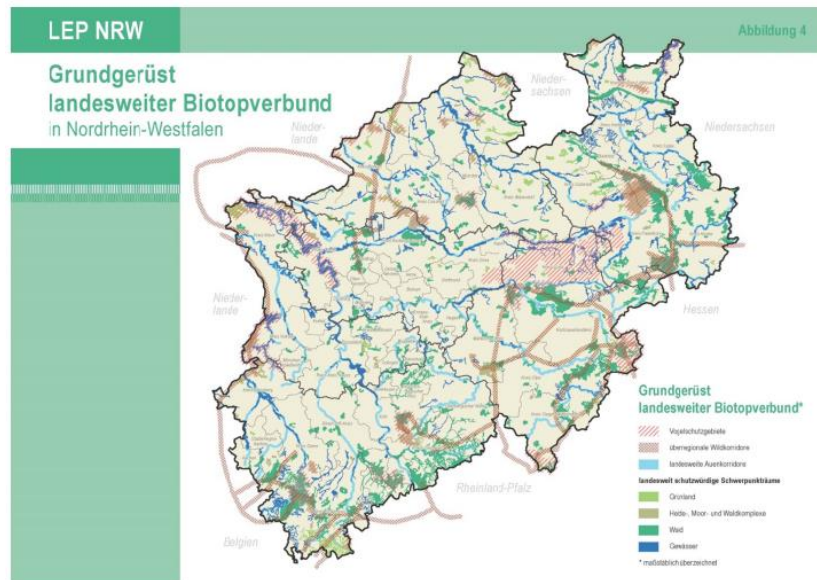
At the Länder level, the general responsibility of the states for spatial planning meets with the constitutional guarantee of self-government for local communities (Article 28 Grundgesetz). The result is a two-way approach: State Development Programmes and State Development Plans are being established covering the whole territory (not contradicting the federal planning, see above), which are then specified by the Regionalplanung (see below) in which the municipalities are involved.

The state plans (State Development Programmes/State Development Plans) outline both goals, which regions and municipalities are bound to follow, and principles, which they are encouraged but not bound to follow.

As an example: the State Development Plan (LEP, Landesentwicklungsplan) of North Rhine-Westphalia (which is in the process of being revised) is divided into a text and a map part. The text outlines general objectives and principles (referring also to §2(6) of the federal law), and then presents sectoral chapters (on spatial structure, regional and economic development, traffic, nature etc.). There is also a separate chapter on climate change mitigation and adaptation. This chapter formulates the principles and general aims of the LEP with regard to climate change mitigation (such as the protection and efficient use of resources and energy, an increase in renewable energies, and reductions in GHG emissions) and adaptation (flood protection and retention areas, protection and conservation of water resources, minimizing overheating of cities, and securing the network of protected areas). The map part has the same general structure, but presents maps for each topic. Below in figure 2, an extraction of the LEP of

North Rhine-Westphalia depicting the network of protected areas is presented as an example.

Figure 3.2: *LEP of North Rhine-Westphalia, network of protected areas*



### 3.4 Regional Level - Planning Districts and Regions

On the regional level<sup>3</sup>, the guiding principles formulated at federal and state level - in textual and map form - are translated into plans, mostly using scales not smaller than 1:100.000 (see figure 2 below). The regional level - "*Regionalplanung*" - aims at specifying and implementing the sectoral targets formulated at *Länder* level and integrating these into a comprehensive, legally binding planning document, the *Regionalplan*<sup>4</sup> (also consisting of a textual and a map part). Thus, the regional level serves as a link between the *Länder* and local level planning (BMVBS 2010, Akademie für Raumforschung und Landesplanung 2005).

<sup>3</sup> "Regional level" is in some sources also used to describe the *Länder* level.

<sup>4</sup> Depending on the *Bundesland* and the region, the *Regionalplan* is sometimes also called "regional development plan" or "regional spatial planning program".

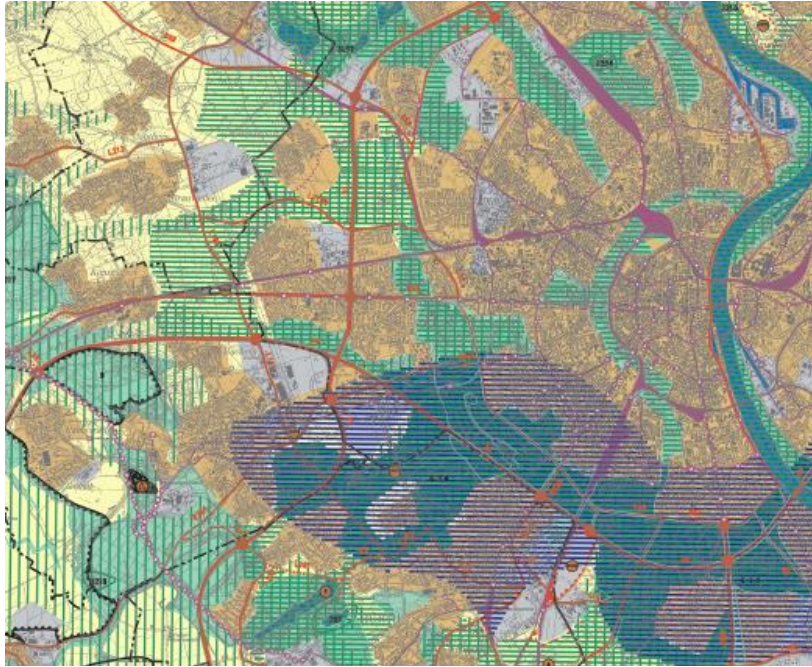


A variety of actors is responsible for the *Regionalplanung*, differing from federal state to federal state. The most important ones are:

- *District Councils:* Bezirksregierungen/ Regierungspräsidien): In some federal states, administrative districts within the state are formed as middle-level administrative authorities, the Bezirksregierungen or Regierungspräsidien, and can be responsible for the Regionalplanung. In North Rhine-Westphalia, for example, this is the case.
- *Planning Regions:* (Regionaler Planungsverband/ Regionalverband): In other federal states, such as Brandenburg or Saxonia, the state area is subdivided into planning regions. In each of these regions a regional planning association, called either a Regionaler Planungsverband or a Regionalverband, is established, comprised of representatives of the local authorities within the region. They serve as a forum for coordination and cooperation between these authorities and are responsible for the preparation of the Regionalplan.
- *City States:* the city states (Berlin, Bremen, Hamburg) skip the level of Regionalplanung and directly prepare the preparatory land-use plan (Flächennutzungsplan).

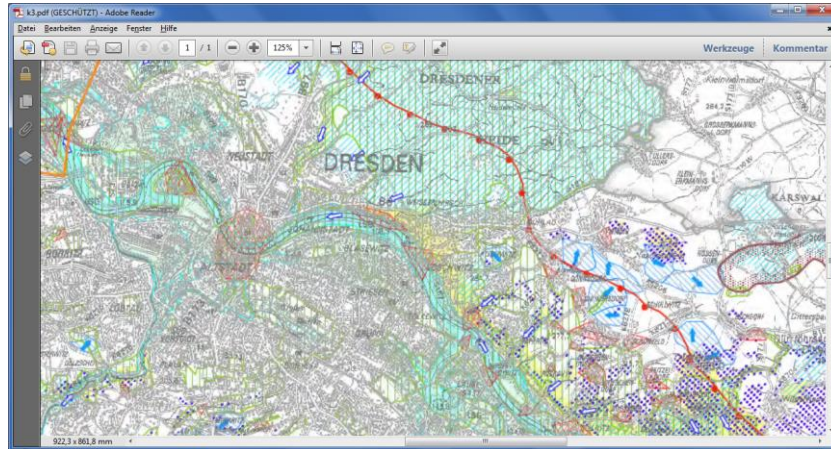
The figure below shows an extract of the *Regionalplan* for the *Regierungsbezirk* Cologne. The city itself is located on the right side of the map, which depicts different land-uses and land-use intensities.

Figure 3.3: *From the Regionalplan for the Regierungsbezirk Cologne.*



As a second example, the figure below shows the content and spatial scale of the *Regionalplan* for the planning region "Oberes Elbtal/Osterzgebirge" (which includes the city of Dresden). It depicts priority areas for flood protection (turquoise), areas in which cool air is formed (blue), heritage landscape features (yellow), and historical urban areas (red).

Figure 3.4: *Regionalplan for the planning region "Oberes Elbtal/Ostertzegebirge" (Regionaler Planungsverband Oberes Elbtal/Ostertzegebirge 2009)*<sup>5</sup>.



The *Regionalplan* for the planning region Oberes Elbtal/Ostertzegebirge contains a separate chapter/section on "air quality and climate protection", and the topic "climate change" is consistently mentioned throughout the plan, in the sections where relevant (as an example, the chapter on air quality and climate protection highlights the importance of areas where fresh and cool air develops, and stipulates their conservation and expansion).

### 3.4.1 Local Level - Municipalities

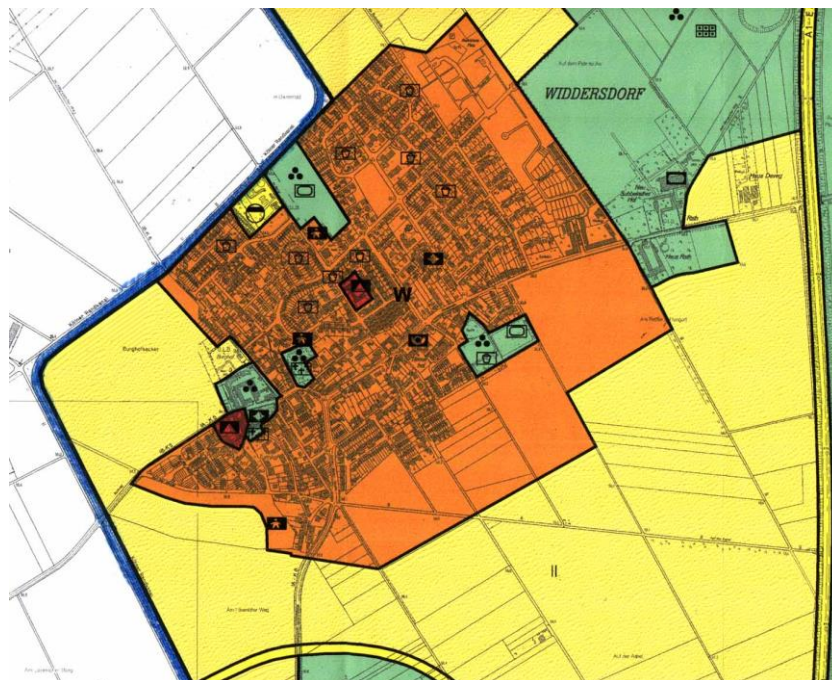
In Germany, local planning is a two-fold process, involving two spatially explicit<sup>6</sup> plans: a non-binding preparatory land-use plan (*Flächennutzungsplan*), which identifies allowed future land uses on a bigger scale (according to projected needs), and a more detailed binding land-use plan (*Bebauungsplan*), which addresses only those areas planned for growth, on a small scale. The *Bebauungsplan* must conform with the *Flächennutzungsplan* (see *Gegenstromprinzip* above),

<sup>5</sup> The spatial planning documents available electronically in Dresden are protected by password - it is not possible to copy/paste contents of the plans. Hence, the plan needed to be presented via screenshot.

<sup>6</sup> Spatially explicit means that the plans do not assign guiding principles to areas, but instead very explicitly name the areas in which a certain kind of utilization and land uses (e.g. economic, mixed economic-housing, housing only, etc.) or a certain kind of building(s) is allowed or not.

and is binding for private landowners and developers, thus giving the municipality control over the form of development (European Commission 1999, Turowsky 2002). Both the preparatory land-use plan and the more detailed land-use plan are administered by the respective authority of the municipal administration. The authority is also obliged to make the plans publicly available, thus giving a certain level of democratic control over the spatial planning decisions at the municipal level. To demonstrate the detail and spatial scale depicted in the local plans, an extract from the preparatory land-use plan of Cologne is presented below.

Figure 3.5: *Preparatory land use plan (extract), Cologne, building expansion Widdersdorf-Süd (orange: area for building housing; green: parks/green spaces; yellow: agriculture)*<sup>7</sup>.



### 3.4.2 Sectoral Planning - Fachplanung

Parallel to the vertically integrated spatial planning described in the sections above, sectoral planning takes place at all levels. The

<sup>7</sup> [http://www.koeln-widdersdorf.de/wig/aktionen/wid\\_sued.htm](http://www.koeln-widdersdorf.de/wig/aktionen/wid_sued.htm)



specialized sectors and the respective authorities (i.e. ministries for transportation, water, energy) provide input through sector plans (*Fachpläne*), which are formulated independently from spatial plans and then integrated by planning authorities. This process, as well as the level of how binding the sector plans are for the different levels of spatial planning, is very varies and complex.

Nevertheless, it is important to note that in most cases the sector plans need to be taken into account in spatial planning. The level of *Regionalplanung* is an important level with regard to coordinating and mediating between different (and diverging) sectoral planning interests. In the figure below, the different levels of spatial planning in Germany are depicted in an overview table.

Figure 3.6: *Spatial planning in Germany (own design).*

Level of planning	Institution responsible	Name of the plan/program	Specific planning (e.g. traffic, environment)
<b>Federal level (Bund)</b>	BMVS Conference of Ministers	Framework („Leitbilder der Raumordnung“)	Parallel at all levels.
<b>Federal state (Länder)</b>	Resp. State Ministry (mostly environment)	State Development Program or –plan („Landesentwicklungsprogramm, -plan“)	
<b>Region (Regierungsbezirk, Planungsverband)</b>	Differs (can be special planning districts, regions, or administrative districts)	Regional Plan (“Regionalplan” or “regionaler Raumordnungsplan”)	
<b>Municipality (Gemeinde)</b>	Administration of municipality (mostly in the „Baudezernat“)	Urban development planning (Bauleitplanung)	

### 3.5 Planning and climate change adaptation

Climate change issues - mitigation as well as adaptation - are being introduced into spatial planning in many different ways, both directly (i.e. implicitly under the "headline" climate change) and indirectly (i.e. through existing topics, such as flood protection, renewable energies, biodiversity protection etc.). This makes it difficult to identify the governance level which is most relevant for integrating climate change into planning. However, as the

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Bundesregierung (2008), IPCC (2007) and Stern (2006) state: planning is imperative for reducing vulnerability, building capacity for mitigation and enhancing the adaptive capacity towards negative impacts of climate change.

In the German spatial planning system, the higher levels define principles and guidelines, which are important as the lower levels must not contradict these, or at least consider them. Nevertheless, as the planning on federal and state (*Länder*) level does not yet involve spatially explicit planning decisions (exceptions are the city states, see above), the lower levels seem more relevant for integrating specific topics into planning. Especially the regional level, as the most relevant governance level for coordination and mediation between different (and diverging) sectoral planning interests, is crucial (Schüle 2013, Biesbroek et al. 2010, Bundesregierung 2008, Greiving 2010).

Hence, integrating climate change issues into planning decisions could best take place in the *Regionalplan*, which is already happening in almost all German *Regionalpläne* (BMVBS 2010). In the process towards the *Regionalplan*, the differing (and sometimes conflicting) land uses have to be reconciled, especially with regard to the different sector plans.

From the perspective of climate change, the objective towards the *Regionalplan* would be to minimize emissions and vulnerability and to maximize adaptive capacity. This could, for example, be accomplished through the usage of renewable energies (i.e. through dedicating areas), or through banning certain, dangerous usages from flood prone areas (BMVBS 2010).

The focus, however, is until now clearly set on mitigation issues (e.g. areas for wind energy production or other renewables). Adaptation issues are yet rarely considered in the regional plans, except indirectly (e.g. through flood protection areas or for the development of cool air). Exceptions are the regions which participated in the KLIMZUG program (like Dresden, for example).

## 3.6 Description of the responsibilities for local climate change adaptation

As outlined in the previous sections, many measures and decision to take in the frame of climate change adaptation have to be taken at local level. However, regional and national authorities also have important tasks towards the local level – for example supervising, controlling and knowledge production. In this chapter, the tasks and responsibilities of the local level (municipal/town/city-level) are described in more detail and in relation to regional (*Länder*) and national responsibilities.

### 3.6.1 Historic development of climate change adaptation in Germany

Today's German climate policy is based on two pillars: climate change mitigation and adaptation. "Mitigation" comprises the avoidance and reduction of climate-relevant substances such as CO<sub>2</sub> and methane. "Adaptation" includes all measures to decrease the negative consequences of a changing climate, and to make use of the positive ones.

Even though the IPCC already demanded in its third assessment report issued in 2001 that climate policy should include both mitigation and adaptation (IPCC 2001), in German climate politics the focus was first on mitigation and then from 2007 on also adaptation (Daschkeit 2012). In 2007 a working group with representatives from most federal ministries under the auspices of the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) started working on the "German Strategy for Adaptation to Climate Change" (*Deutsche Anpassungsstrategie an den Klimawandel*, DAS), which was adopted by the German federal cabinet (*Bundeskabinett*) in December 2008. This strategy document highlights the need for adaptation, describes the consequences of climate change in Germany for nature and society and frames the responsibilities of national, regional and local authorities. As sectors with a high adaptation need and potential are mentioned the water industry, agriculture, human health, biodiversity and nature conservation. The areas of civil protection and land use planning are said to have cross-

sectoral responsibilities for climate change adaptation (Daschkeit 2012).

The strategy document was followed by the “Adaptation Action Plan of the German Strategy for Adaptation to Climate Change” (Aktionsplan *Anpassung der Deutschen Anpassungsstrategie an den Klimawandel*, APA) adopted by the federal cabinet in 2011. Besides federal ministries also the *Länder* and private actors as e.g. the Chambers of Commerce and Industry (*Deutscher Industrie- und Handelskammertag*, DIHK) were involved in its development (Daschkeit 2012). The action plan concretizes activities of the federal government and the *Länder*, but takes into account also activities of non-state actors. The main pillars of the action plan are:

- *Pillar 1: Provide knowledge, inform, enable.*
- *Pillar 2: Setting frameworks for climate change adaptation.*
- *Pillar 3: Adapt federal properties and duties to climate change.*
- *Pillar 4: Represent Germany in international climate change related issues.*

Pillar 1 aims at increasing knowledge on climate change and its implications on regional and local level. Activities include to finance and initiate research projects, collect examples on good local adaptation practices and provide IT-supported information targeted at local adaptation. Support of local authorities is explicitly mentioned under pillar 1 (Daschkeit 2012). Pillar 2 comprises the systematic evaluation of norms and technical guidance documents (e.g. German building law (Baugesetzbuch)) in the light of climate change adaptation and changes to them, if necessary. The German Institute for Standardization (Deutsches Institut für Normung, DIN) has e.g. setup an own working group on the topic. Pillar 3 encompasses activities in all sectors with direct responsibilities of the federal government as e.g. federal infrastructures and buildings. Here is a clear need for coordination between the federal government, the *Länder* and municipalities, as the responsibilities are shared in several sectors. Pillar 4 are the international responsibilities and activities in the field of climate change adaptation, which include the interaction of the federal government with the EU Commission (e.g. for the EU climate



change adaptation strategy) or the coordination of activities with neighboring states (e.g. integrated river basin management for transboundary rivers as Rhine, Odra, Elbe, Danube).

### 3.6.2 Current status of climate change adaptation in Germany

The adaptation strategy and action plan were followed by several activities. These include for the pillar 1 the funding of several research projects, which e.g. focused on climate change in regions (KLIMZUG), municipal strategies for climate change adaptation (StadtKlima, ExWoSt), land use planning and climate change adaptation (KlimaMoro), etc. At institutional level a competence centre on climate impacts and adaptation (Kompetenzzentrum Klimafolgen und Anpassung, KomPass) was set up at the Federal Environment Agency (Umweltbundesamt, UBA), as well as a Climate Service Center. On the political level an “inter-ministerial working group on adaptation strategies” (Interministerielle Arbeitsgruppe Anpassungsstrategie, IMA Anpassungsstrategie) was institutionalized. The cooperation of federal government and the Länder is ensured by a “standing committee on climate change adaptation” (Ständiger Ausschuss Anpassung an die Folgen des Klimawandels, StA-AFK) (Daschkeit 2012). As support of local authorities is explicitly mentioned under pillar 1, since 2011 the federal government offers also financial support to municipal climate change adaptation (Daschkeit 2012).

Related to pillar 2, the German Institute for Standardization published two standards: “Stakeholder Engagement - Guidelines for decision making processes dealing with climate change” and “Scenario Planning - Guidelines for decision making processes dealing with climate change”. Another standard on “Projections on climate change and ways for handling uncertainties» is under development. Further, the German building law was revised in 2011 to take into account requirements of climate change. On the Länder level, a practical result was that several federal states (e.g. Bavaria, Baden-Württemberg, Schleswig-Holstein) operate today with a “climate surcharge” (Klimazuschlag) when planning new infrastructures such as dikes and dams in the water sector. Pillars 3 and 4 comprise national tasks and will not be discussed here further.

Today in Germany climate change mitigation and adaptation are seen as complementary to each other. But the headstart of mitigation had and has consequences for adaptation as e.g. in public perception climate change activities are still more connoted with mitigation than with adaptation (Daschkeit 2012). An interesting example provides e.g. the revision of the German building law. Even though mitigation and adaptation are both mentioned in the text, the revision firms under the title “Klimaschutznovelle 2011” (“climate protection novella”), which clearly points towards mitigation, but not towards adaptation. Further it can be observed that the same administrative “routes and structures”, which were developed for mitigation, are now used for adaptation activities. The German Institute for Urbanistic (Deutsches Institute for Urbanistik, DIFU) was e.g. first in charge of consultation on funding possibilities for climate change mitigation and is now also for adaptation.

Due to the uncertainty on local climate change impacts, the general advice for local climate change adaptation is to implement flexible no-regret measures (e.g. measures, which are able to handle the whole spectrum of possible CC consequences), use the synergies of mitigation and adaptation and maximize additional benefits from other sectors (e.g. climate change adaptation measures, which at the same time help to preserve biodiversity).

For 2014 an evaluation of the national action plan and the strategy was envisaged, but it was postponed to 2015.

### 3.7 The tasks and responsibilities of municipalities (local level)

The general tasks and responsibilities of municipalities are regulated in the German Constitution (Art. 28 Abs. 2 GG) and in the constitution of each *Bundesland*. These laws guarantee the municipalities sovereignty over personnel, organizational, planning, financial, tax and some legislative issues within their territory, but requires of them to fulfill basic services for the public (*Daseinsvorsorge*). Roughly, two types of tasks can be distinguished: "self-government tasks" and "transferred mandatory tasks". Transferred mandatory tasks are tasks for which the respective *Land* is actually responsible, but which are transferred to the

municipalities. These include construction supervision (*Baunaufsicht*) and order administration (*Ordnungsverwaltung*) such as police and trade supervision. Self-government tasks can be distinguished into mandatory and non-mandatory tasks. Mandatory tasks include e.g. land use planning (*Bauleitplanung*), fire protection, civil protection, energy and water provision, waste removal, local public transport, provision and maintenance of health care facilities, schools, kindergartens, etc. Non-mandatory tasks can be selected by each municipality on its own and after its perceived needs and requirements to fulfill further services for the public. This can (but has not to) include operation of public libraries, museums, sport and social facilities, construction and maintenance of parks, etc.

Climate change adaptation is per se a non-mandatory self-government task, but due to its cross-sectional nature (*Querschnittsaufgabe*) (DIFU 2013) it comes also into play under mandatory transferred tasks (e.g. as construction supervision) and under mandatory self-government tasks (e.g. as civil protection and land use planning). The German adaptation strategy (DAS) states concerning the responsibilities of municipalities:

“Since adaptation usually has to take place at regional or local level, many decisions have to be taken at the level of the municipality or administrative district. The Federal Government will therefore get together with the central associations of the local authorities and with representatives of interested municipalities and districts to discuss the measures and assistance that can be used to develop and implement local adaptation concepts.”

Nevertheless, there is no direct legislative anchorage of climate change adaptation. In practice it is often the environmental department or planning office which is responsible to assure that climate change is considered in municipal activities. And usually adaptation and mitigation are put together, which is probably due to the fact that climate change mitigation was longer on the agenda than adaptation.

What do empirical studies on municipal climate change adaptation find to be the status of local adaptation work? Two empirical studies provide interesting insights concerning climate change adaptation on the municipal level:

A survey among German municipalities (N=276) and private businesses in 2011 revealed that already 47% of the municipalities followed an adaptation strategy (Rösler et al. 2013). Activities were reported in the areas of flood protection, public relations/awareness, land-use planning, improvement of urban climate by greening, development of adaptation concepts, civil protection, transformation of impervious surfaces, health care, etc. Especially larger municipalities have formed interdisciplinary working groups across departments to consider climate change adaptation properly. Involved municipal departments were mostly environment, urban planning and development, civil engineering, transport, water supply and sewage disposal, as well as health. In some cases external institutions such as energy providers or research institutes were involved. Planning measures were perceived by most assessed municipalities as the best instrument to do climate change adaptation in several policy fields such as water supply and sewage disposal, transport, health, energy supply, agriculture and forestry (Mahammadzadeh and Chrischilles 2012). A challenge for the municipalities is not only the topic of climate change adaptation itself, but also its integration in existing municipal structures and processes (DIFU 2013).

The explorative study of Roggero and Thiel (2014) among municipalities along the North Sea coast, the middle reaches of the Rhine and parts of Bavaria, focused on institutional aspects of climate change adaptation. They found that there was a broad consensus that for effective climate change adaptation interdisciplinary cooperation between state institutions, business and society was necessary. Climate change adaptation is perceived as cross-sectional task and should as such be a part of existing departments. A bundling of competences (e.g. an own climate change adaptation department) was not seen as favourable, but informal coordination was preferred. The planning department would have a central role in this. Climate change adaptation is seen as a process and actually it is in the phase of problem recognition and awareness raising, thus most regional and local “adaptation strategy” documents were lacking lists of concrete measures and prioritization of measures (e.g. under consideration of cost-effectiveness) was not done. Nevertheless the authors could identify trends of future adaptation, which were e.g. a prioritization of flood protection measures even though they were in conflict

with other policy objectives (e.g. protected areas), high support for citizens self-precaution, preference of no-regret measures to account for high uncertainty of possible impacts. Also, climate change mitigation seems to go before adaptation in the case of conflicting aims. An overall interesting finding was, that the screened documents avoided to talk about possible conflicts, which might arise due to conflicting aims, user conflicts or by informal and less coordinated implementation of climate change adaptation measures in different departments.

### 3.8 The responsibilities of regional and national level – for local climate adaptation

On the national level, central roles in climate change adaptation are played by the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB), which coordinated the elaboration of the DAS and funded several adaptation projects, and the Federal Environment Agency (UBA), which hosts the competence center “KomPass - Climate Impacts and Adaptation in Germany“, coordinates the cooperation between the *Länder* on climate change adaptation and provides rich online resources on climate change adaptation. Permanent cross-departmental working groups on federal level are the inter-ministerial working group on adaptation strategies, which elaborated the APA, and the standing committee on climate change adaptation (STA AFK), which was funded by the German Conference of Environmental Ministers (*Umweltministerkonferenz*) and serves as a tie between the federal level and the *Länder*.

The subsidiarity principle implies that a large share of the tasks related to climate change adaptation falls on municipalities. But there are superior tasks related to climate change adaptation, which are realized on the national and *Länder* levels. These are strategic tasks such as the evaluation of the APA in 2015 and the elaboration of a second APA (APA II) or the preparation of adaptation strategies on *Länder* level, but also knowledge generating tasks such as the compilation of a climate change vulnerability analysis in a network involving several federal

ministries<sup>8</sup>. Other activities include the provision of funding for adaptation measures – currently mainly in the area of knowledge generation. Also, on the level of measures the federal government and the *Länder* become active e.g. concerning flood protection on large rivers (*Bundeswasserstraßen*) or along the coast. The federal government as well as the *Länder* have also the responsibility to create conditions to enable not only municipal adaptation, but also private adaptation and self-precaution based on free markets. In cases of market failure it can be economically efficient that the federal government and/or the *Länder* invest in adaptation. For example in the case of coastal protection, the federal government and the concerned *Länder* share the costs for adaptation measures. On the other hand, there is an ongoing discussion in Germany on the pros and cons of financial help provided by the state e.g. after severe flooding events, as this kind of state involvement is thought to weaken the motivation for private precaution<sup>9</sup>.

### 3.8.1 Law and regulation

Whereas there is a strong anchorage of climate change mitigation in German legislation, there is currently only a weak anchorage of adaptation. Beside the German building law (§1 Abs. 5 BauGB (2004)), climate change adaptation is currently mentioned in the German planning law (*Raumordnungsgesetz*) and in the German water law (§6 (1), 5 WHG (2009)). Both laws require the management of space and water bodies in a way that possible impacts from climate change are minimized or prevented.

Besides, there are also other European and national laws and regulations from other spheres of activity, which are indirectly related to climate change adaptation. These are, for example, the spheres of emergency planning, agriculture and forestry, nature protection (see e.g. Schumacher et al. 2014) and health.

### 3.8.2 Information and guidance

As proposed in the DAS and specified in the APA, the federal government spent money to improve the knowledge basis on

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<sup>8</sup> Netzwerk Vulnerabilität: <http://netzwerk-vulnerabilitaet.de/tiki-index.php>.

<sup>9</sup> <http://www.klimanavigator.de/dossier/artikel/037528/index.php>.

climate change and adaptation. They initiated the Climate Service Center – CSC<sup>10</sup>, which “*offers products, advisory services and decision-relevant knowledge based on sound scientific knowledge in order to support government, administration and business in their efforts to adapt to climate change*”. Under the auspices of the German Federal Environmental Agency (UBA), the competence center “KomPass - Climate Impacts and Adaptation in Germany<sup>11</sup>” is run with the objectives to give policy advice, promote environmental research, provide information and foster networking and participation.

As a result of these activities and further activities funded by the federal government and the *Länder*, nowadays there is a rich body of information on “local climate adaptation” available. It includes online training for beginners in climate change adaptation, collections and databases listing good examples of municipal climate change adaptation, research reports on specific problems, etc. The question emerges if it is not too much information, how “newcomers” should navigate through it and what are the most useful sources (a selection of online-resources is provided in an annex).

However, due to the local character of climate change impacts, the uncertainty of the exact impact and the local conditions (e.g. topography, size of municipality, financial resources, etc.), there is no “one-solution-fits-all”. In addition, and in comparison to mitigation, adaptation is still quite new on the municipal agenda. This may at least partly explain the large variation between municipalities concerning their adaptation activities, the lack of concrete adaptation measures in local adaptation strategies and the focus on processes of how to integrate climate change adaptation issues in existing municipal structures and processes (Roggero and Thiel 2014).

### 3.8.3 Financial instruments

Concerning financial instruments for climate change adaptation, one has to distinguish financial instruments on the private market and public financial instruments. On the private market it is mainly

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<sup>10</sup> <http://www.climate-service-center.de>

<sup>11</sup> <http://www.umweltbundesamt.de/themen/klima-energie/klimafolgen-anpassung/anpassung-auf-kommunaler-ebene>

the insurance industry, which sells adaptation-related products in form of hazard insurances (for more details see chapter 5). The public sector supports climate change adaptation by funding a broad variety of adaptation activities, from full financing of research projects to co-financing or lending of money for concrete measures. There are funds available from the EU Commission, the federal government, the *Länder* and at municipality level to finance climate change adaptation measures<sup>12</sup>. Not all funding is directly targeted to climate change adaptation, but there are programs which focus on other areas, but contribute also to adaptation. An example is the insulation of housing which saves energy, but also contributes to adapt to extreme heat events.

Municipalities appear in the role of beneficiaries, but also as sponsors e.g. of measures to be implemented by private persons. The DIFU is in charge of consultation for municipal subsidies for climate change mitigation and adaptation<sup>13</sup>.

### 3.9 Network mechanisms

Several networking mechanisms for climate change adaptation with various actors and different degrees of formalization can be found and distinguished in Germany. Among these are:

- Networks, which involve several sectors on the same administrative level e.g. the national network on vulnerability.
- Networks with large sectoral homogeneity, but a large spatial dimension such as the international river commissions e.g. International Commission for the Protection of the Rhine<sup>14</sup> and Elbe<sup>15</sup> rivers.

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<sup>12</sup> An overview is given here:

[http://www.klimascout.de/kommunen/index.php?title=F%C3%B6rderinstrumente\\_%28%C3%B6ffentlich\\_und\\_privat%29](http://www.klimascout.de/kommunen/index.php?title=F%C3%B6rderinstrumente_%28%C3%B6ffentlich_und_privat%29).

Database: <http://www.foerderdatenbank.de/>

<sup>13</sup> Das Service- und Kompetenzzentrum: Kommunalen Klimaschutz:

<http://www.klimaschutz.de/de/zielgruppen/kommunen/service/ueber-uns>

<sup>14</sup> <http://www.iksr.org>.

<sup>15</sup> <http://www.ikse-mkol.org>.



- Self-initiated very local interdisciplinary networks, e.g. cross departmental working-groups in larger municipalities (see findings of Rösler et al. 2013).
- Network mechanisms initiated by the federal or *Länder* governments such as research projects, e.g. KLIMZUG<sup>16</sup>.

As the municipal survey from 2011 presented above showed, cross-departmental networks were already established back then (partly with involvement of private businesses), but mainly in larger municipalities (Rösler et al., 2013). With the help of public funding new networks such as KLIMZUG were initiated. These new networks involved also actors from research and there is even an emerging research body on these networks (see e.g. Hutter (2014)). But the question emerges what happens with these networks after their funding period finishes (e.g. for KLIMZUG in 2014).

### 3.10 Description of insurance systems for natural hazards (flooding and avalanches)

Currently in Germany, natural hazard insurance (*Elementarschadensversicherung*) which included insurance against floods, is a voluntary insurance provided by private insurance companies. In the past, governmental flood loss compensation was granted after severe events as e.g. in 2002, but there is no legal guarantee for such governmental compensation. The following text is copied from Hudson et al. (2014), which provides a short and good overview of the German insurance system (references are added to the bibliography).

“The German flood insurance market is based on free market provision (Keskitatalo et al. 2014). In addition to flood insurance payouts, government compensation and public donations play an important role in compensating flood damage; which may limit the insurance market by the presence of charity hazard. Flood insurance is provided as a bundled coverage with other natural hazard risks as a supplement to regular building or contents insurance (Keskitatalo et al, 2014; Seifert et al, 2013).

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<sup>16</sup> <http://klimzug.de/index.php>.

The premium of the flood insurance supplement's contribution to the natural hazard bundle is to a certain extent differentiated on the basis of the flood probability. This is done using the Zürs flood zoning system (GDV 2008). Zürs produces 4 zones of flood probabilities ranging from 1 (less than 1/200 years chance of flooding) to zone 4 (greater than 1/10 years chance of flooding). Moving from zones 1-4 entails an increase in premiums and deductibles (Seifert et al. 2013). The majority of households are located in zone 1, 10-12% are in zone 2, while 3% of households live in zones 3 and 4 (GDV 2008).

The penetration rate of flood insurance increased strongly in recent years. About 10 years ago it was estimated to be between 3-10% (GDV 2003; Rheinland-Pfalz 2005) and it is now estimated to be 19% and 33% for contents and residential buildings, respectively (GDV 2013). The national average hides large regional differences of penetration rates in Germany (Seifert et al. 2013). For instance, 95% of households are estimated to have flood insurance in Baden-Württemberg<sup>17</sup>, while this is only 11% in Bremen (Keskitalo et al. 2014). Overall, East Germany is estimated to have higher penetration rates than West Germany, due to a history of compulsory flood insurance in the East.”

Beside buildings it is also possible to insure household contents or cars against losses from natural hazards. Similar insurance policies are also available for trade and industry (for more details, Lange 2011). The German insurance industry is quite proactive in promoting natural hazard insurance. In 8 federal states, information campaigns to promote natural hazard insurance were run by the *Länder* in cooperation with the insurance industry (GDV 2015b; JRCC 2013). This resulted in an increasing number of people who obtained natural hazard insurance.

Further the insurance industry develops and runs an information system about natural hazards such as “*Kompass Naturgefahren*” (<http://www.kompass-naturgefahren.de>), which is the public version of the above mentioned Zürs flood zoning system. The system is continuously updated by including new flood maps generated, e.g. in the context of the EU Floods Directive. Integrating data generated by public water authorities is

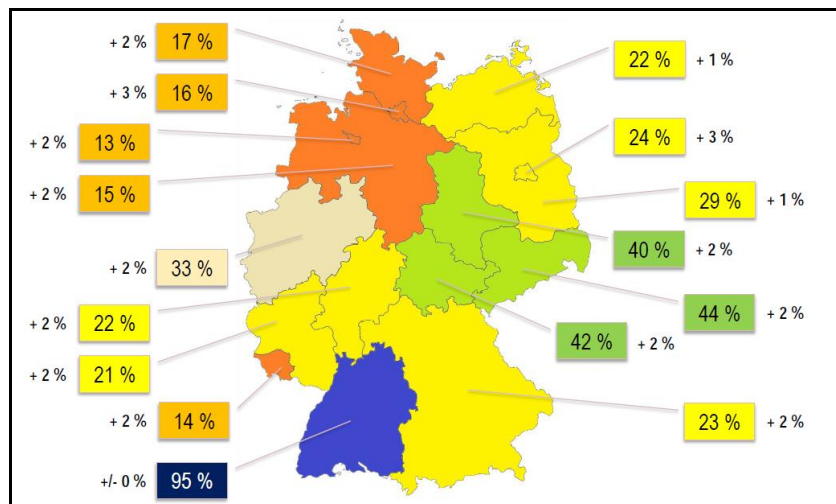
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<sup>17</sup> Until 1994 Baden-Württemberg had a compulsory natural hazard insurance.

advantageous, as insurance industry and public authorities then share the same data basis.

There was a controversial discussion in Germany about introducing a compulsory natural hazard insurance, which was triggered by each new event causing losses. This discussion was ended when first European parliament in 2014 rejected a compulsory European natural hazard insurance (GDV 2014b) and then the German conference on justice ministers (*Justizministerkonferenz*) rejected a German compulsory solution (GDV 2015a). The main argument against a compulsory insurance is that it would lead to less preventive behavior and thus increase losses and premiums on the long-run (von Fürstenwerth 2014).

Figure 3.7: *Percentage of German households with a natural hazard insurance and last year increase in insurance density as per March 2014. Source: GDV, 2014a.*



Municipalities can also insure their property against flood losses. Recourse claims (*Regressförderung*) by citizens, which suffered flood losses, are covered by the municipal liability insurance (*Haftpflichtversicherung*). In Eastern Germany municipalities can obtain liability insurance to good conditions from the KSA – *Kommunaler Schadensausgleich* (municipal loss compensation). KSA is a municipal self-help organization, which offers insurance services and products, but has not the same legal status as an insurance company.

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## 4 Institutional conditions for local adaptation to climate change in Sweden

*Sverker Jagers, Lennart Lundqvist and Mikael Seva*

### 4.1 Sweden's three-tier system

Sweden is a unitary state with a history of strong local government involvement in public affairs. The country covers an area of 450,000 square kilometers with a population of around 9, 8 million by the end of 2014. The Swedish Constitution and Swedish Local Government Act state that Sweden has three levels of government, the national parliament, the county councils and the municipalities, all popularly elected. There are 21 county councils (*landsting*) and 290 municipalities (*kommuner*). Two areas constitute an experimental form (*region*), Skåne and Västra Götaland. The island municipality of Gotland combines the functions of county council and municipality.

Table 4.1: *Sweden's governmental structure (\* popularly elected)*

<b>Sweden's Three-tier Governmental Structure</b>			
<b>State</b>		<b>21 Counties</b>	<b>290 Municipalities</b>
<b>National</b>	Parliament* Cabinet Government Offices, central authorities		
<b>Regional</b>	21 County Administrative Boards ( <i>länsstyrelse</i> ) (The regional arm of the state)	County Councils* ( <i>landstings- or regionfullmäktige</i> ) County Council Boards ( <i>landstings- or regionstyrelse</i> ) Regional Sector Administrations (Health, collective transport, culture)	
<b>Local</b>	Local Centres of Central Authorities (example: The National Insurance Office has 151 such centres)		Municipal Council* Municipal Council Board Local Sector Administrations (e.g, Planning Office, Environmental Bureau)

At the *national* level, the Cabinet presents legislative proposals as well as an annual national budget for adoption by the 349 member Parliament. There are numerous central authorities that are charged with implementing national legislation, following developments within their sectors of authority, and presenting advice to government. It should be noted that these agencies are formally independent of the Ministries; a Minister can only provide objectives and guidelines for agencies, but cannot dictate the content of specific agency decisions.

In March 2009 the Swedish Government presented a coherent climate and energy policy which lay the foundation for the future efforts that need to be made in order to contribute to a stabilization of the greenhouse gas concentration at a level that enable the 2 degrees Celsius target to be reached. Sweden's targets for climate and energy policy by 2020 are:

- 40 per cent reduction in greenhouse gas emissions
- At least 50 per cent renewable energy
- 20 per cent more efficient energy use
- At least 10 per cent renewable energy in the transport sector

The comprehensive climate bill of 2009 (Govt. Prop. 2008/09:162) also outlined authority and responsibility for governing climate change adaptation across national, regional and local levels of government.

## 4.2 National authorities and agencies with responsibility for climate change adaptation

There are a number of *national* authorities and agencies with important functions in the adaptation to climate change and its impacts (Swedish acronyms in brackets):

- The Swedish Civil Contingencies Agency (*MSB*)
- The Swedish Geotechnical Institute (*SGI*)
- The Swedish Meteorological and Hydrological Institute (*SMHI*)
- The National Board of Housing, Building and Planning (*Boverket*)
- The Swedish Environmental Protection Agency (*Naturvårdsverket*)

The first four of these national authorities are particularly involved in climate adaptation, i.e., the MSB, the SGI, *Boverket* and the SMHI. It is notable that *Naturvårdsverket* is mainly responsible for issues of climate mitigation, in particular for gathering data on emission trends and coordinating Sweden's annual national reports to the United Nations Framework Convention on Climate Change (*Naturvårdsverket* 2014). With regard to climate adaptation, investigations and recommendations from the national authorities

provide local and regional levels with information and knowledge on projected risks of flooding and landslides, and impacts following from such climate change phenomena as intensified precipitation.

The *Swedish Geotechnical Institute, SGI*, ([www.swedgeo.se/](http://www.swedgeo.se/)) carries out geotechnical and geo-environmental research that contributes to safe, economical and environmentally sustainable development in the geotechnical field. SGI is dealing with expert advisory services, research and development, and information activities.

Commissioned by the national government, SGI has an overall responsibility for geotechnical issues in Sweden, as well as a particular responsibility as a governmental expert body for safety issues relating to landslides and coastal erosion. The know-how of SGI comprises land use planning, foundation engineering and the technique of soil reinforcement, slope stability, ground energy, polluted land and sediments, re-use of by-products, field and laboratory investigations. Of particular interest to this comparative project are the SGI investigations on flooding, slides and erosion risks in the Göta River to which our selected water course *Mölnålsån* is a tributary (see, egg, SGI 2012).

The *Swedish Civil Contingencies Agency, MSB*, ([www.msb.se/](http://www.msb.se/)) is responsible for issues concerning civil protection, public safety, emergency management and civil defense as long as no other authority has responsibility. MSB works in close cooperation with the municipalities, county councils, other authorities, the private sector and various organizations to achieve greater security and safety at all levels of society. This is done by way of knowledge enhancement, support, training, exercises, regulation, supervision, and through own MSB operations. In particular, the MSB is promoting the use of risk and vulnerability analyses as part of their regular planning processes, and in 2011 produced a report on specifically flood-prone areas in Sweden (MSB 2011). Together with the County Administrative Boards, the SMHI and the FOI (Swedish Defense Research Agency), MSB produces event scenarios for heat waves and heavy rains for use by local and regional governments to include climate adaptation in their risk and vulnerability analyses (see FOI 2011).

The *Swedish Meteorological and Hydrological Institute, SMHI*, ([www.smhi.se/](http://www.smhi.se/)) is a government agency under the Ministry of the

Environment. The Institute manages and develops information on weather, water and climate and provides knowledge and advanced decision-making data as an important foundation for decision-making in public services, the private sector and for the general public. The climate of the future is being studied at the climate research unit Rosaby Center. As an expert authority within the climate field, SMHI participates in international climate discussions and collaborates with other national and regional authorities on climate and climate change adaptation issues. The SMHI runs a national center of knowledge for adaptation to climate change. The role of the center is to act as a hub for knowledge on climate change and to represent a meeting place for actors involved in climate change adaptation. SMHI collaborates daily with government agencies and organizations, both within and outside the country borders. We represent Sweden in several international organizations. The SMHI climate studies are of special interest here. Among other things, SMHI researchers have developed improved knowledge about the connections between climate models and hydrological models. This has enabled researchers to examine the climate effects on water flows, floods and transport of nutrients. They have also created new hydrological future scenarios for Sweden and Europe, as well as knowledge of local climate impact on water flows and water quality. Researchers at SMHI have also developed new methods for estimating the size and impacts of future intense precipitation, thus providing important in-data for municipal climate adaptation and social planning.

The *National Board of Housing, Building and Planning, Boverket*, ([www.boverket.se](http://www.boverket.se)) monitors the function of the legislative system under the Planning and Building Act and related legislation and proposes regulatory changes if necessary. It provides information on climate-related issues to those engaged in planning, housing, construction and building inspection activities (see, e.g., Boverket 2010). Boverket is also charged with keeping and continuously updating the national record of the Master Plans of Sweden's 290 municipalities. Since 2014, Boverket is mandated by the national government to coordinate the work on creating a "platform for sustainable city development", where four other central agencies are also involved. The purpose of this platform is to promote the cooperation and coordination of knowledge, exchange of



experiences among and across levels of authority in urban planning and development.

### 4.3 Regional and local authorities

At the *regional* level, Sweden has a) popularly elected County Councils, and b) County Administrative Boards. The County Councils enjoy the right to levy income taxes on their inhabitants, to finance county-wide services such as public health, regional collective transports, and cultural services. The County Councils also work with regional development programs, including programs for sustainable development. The two *regions*, Skåne and Västra Götaland, have taken over some of the planning and development responsibilities from the CABs on a trial basis. In the Västra Götaland region, ([www.vgregion.se/](http://www.vgregion.se/)) this has taken the form of a climate strategy called *Smart Energy*, where the Region and the 49 local governments of the area have signed an agreement on a strategy to become “fossil free” by 2030 (see VG Region 2009).

The 21 County Administrative Boards (CABs) are best described as the national government’s regional arms. They are headed by a state-appointed governor, with responsibilities mainly for economic planning and regional development. The CABs are entrusted with paramount responsibility for coordinating activities at the county level. They command a strategic view of relations between bodies at local, county and central levels and can therefore act as a connecting link between central and local authorities. CAB duties comprise such diverse tasks as

- *Civil defense, emergency and rescue services*
- *Social welfare and community care*
- *Agriculture and fisheries*
- *Planning and management of natural resources*
- *Nature conservation and environmental protection*

CABs are also responsible for ensuring that the county’s development proceeds in such a way as to facilitate the achievement of national goals while taking account of specific

regional conditions and requirements. Important elements of this task are the promotion of economic, social and ecological development in the county as well as the provision of information for government use on prevailing conditions, problems and opportunities in the region. This task entails co-ordination of the state's regional development measures over a broad spectrum such as business, infrastructure, agriculture, forest and fishing. The task of actively promoting regional development calls for continuous dialogue with other government agencies, the county's local authorities, county councils and other organizations. (The CABs' role in planning is described below).

At the *local* level, Sweden's 290 municipalities are governed by popularly elected Municipal Councils, the sizes of which vary with the number of local inhabitants. The Council elects among its members an Executive Board, which usually commands a political majority within the Council. Local governments enjoy the right to levy income taxes on their inhabitants, to perform a large number of functions, some of which are exclusive to the local level:

- *all primary and secondary education*
- *most social welfare functions*
- *spatial planning*
- *water and sewage*
- *refuse collection*
- *parks and open spaces*

Two cornerstones are fundamental for the constitutional sovereignty of Swedish municipalities. One is already mentioned, i.e., their right to levy income taxes on their inhabitants. The other is their monopoly of physical and spatial planning within their territories. The most important but also the most financially burdensome of the tasks just outlined are education and social welfare. It should be noted that Sweden has an elaborated system of tax compensation to create equal conditions of welfare between municipalities and between counties throughout the country. By 2011 this system comprised 6 100 million SEK. Then only 11 of the 290 municipalities contributed to the system, while the rest were receivers. The municipalities thus have a special role in

climate-change policy as they formulate and implement plans for land use, energy management, transport and waste.

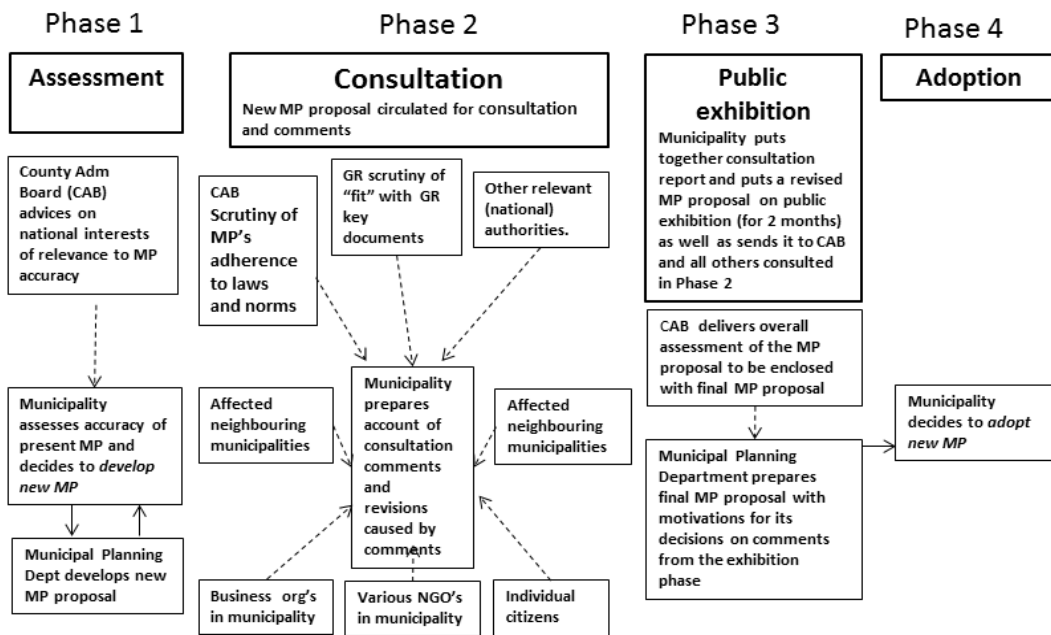
#### 4.4 The Swedish planning system

Swedish physical and spatial planning goes back for decades. In the 1960's and 1970's, this even included a *national* physical plan. This plan designated certain areas as in principle “untouchable” for socio-economic developments, while other areas were designated as growth and expansion areas where heavy industry and polluting activities should be concentrated. Also the investments made in recent decades to expand district heating networks, public transport systems and carbon-free electricity production have been important for creating opportunities (and establishing obstacles!) to spatial planning.

At the *regional* level, Sweden's 21 County Administrative Boards (*länsstyrelserna*, CAB's) are authorized to promote, coordinate and follow up local adaptation strategies and measures when scrutinizing the content of local Master Plans and - if deemed necessary - demand changes and even propose further adaptation measures (PBL Ch. 3, 9-11§§). The 2009 planning bill pointed to the constitutionally guaranteed *local* governmental monopoly on physical planning as a cornerstone of planning for climate adaptation.

The 2010 changes in the PBL makes local governments responsible for addressing the “common interest” of climate change adaptation in their Master Plans by analyzing risks for accidents, floods or landslides, and threats to water supply and public health stemming from projected climate change (see FOI 2011). The PBL also acknowledges the cross-boundary scale of climate change by demanding municipalities to clarify how their Master Plans might affect neighbouring municipalities, regional development programs, county-wide plans for transport infrastructure, regional climate and energy strategies, and national environmental quality (PBL Ch. 2, 3§).

Figure 4.1: *Municipal master planning in Sweden – a multi-level governance perspective*



## 4.5 Actors, Responsibilities and Types of Plans in the Swedish Planning System

### 4.5.1 The municipal level

The Swedish planning and building legislation states that land and water should be used in ways that encourage good long-term, management that provides for ecological, social and economic sustainability. This most important policy instrument is the municipal Comprehensive or Master Plan (översiktsplan, ÖP) which covers the whole municipal territory, including water areas out to the 12 nautical mile territorial limit. Although municipal Master Plans are strategic rather than prescriptive in character, local governments must formulate such plans and review them regularly, normally in intervals spanning 4 up to 8 years. Municipalities may also formulate In-Depth Comprehensive Plans (fördjupad översiktsplan, FÖP) for certain parts, or districts, of

their territory. In such an FÖP, more detailed strategies and guidelines are formulated, and become part of the ÖP when politically approved and adopted by the Municipal Council.

Municipal planning of land use and development within parts of the municipal territory takes place through Detailed Development Plans (detaljplan, DP). These detail plans cover areas to be developed in the near future, and are legally binding. In addition to being quite detailed, they include legal rights to develop in accordance with the plan. Detail plans include a description of how they are to be implemented (genomförandebeskrivning), stating who is responsible for the construction and maintenance of common ground and other common properties of the area, as a result negotiations during the planning process. For limited areas not covered by Detail Plans, municipalities may adopt Area Regulations (områdesbestämmelser) necessary for achieving the intentions of the Master Plan, and/or for the safeguarding of national interests. Area Regulations make it possible to regulate only some aspects of the Municipal Plan. Local authorities produce different types of basic documentation for their Master Plans. Special “green plans”, where the municipal councils decide on the future development and conservation of green zones, have become increasingly common. Furthermore, local governments produce “culture plans” aimed at protecting and preserving areas deemed of special cultural, historic or aesthetic value.

Since 1999, the comprehensive Environmental Code (miljöbalken, MB) covers all environmental matters and functions parallel to the Planning and Building Act. Municipal Master Plans must thus be reviewed also with a view to how they fit in with the general care regulations (allmänna hänsynsregler) as well as the environmental quality norms (miljökvalitetsnormer) contained in the Code. In particular, it is important for local Master Plans to be formulated in such ways that they do not lead to developments that could violate any environmental quality norm.

#### 4.5.2 The inter-municipal and regional level

The major regional actors in Swedish physical planning are the County Administrative Boards (CABs) and – in some instances – special Regional Planning Organizations. Somewhat unique for the Gothenburg Metropolitan Area – (which comprises the three

municipalities in the Mölndalsån catchment area – Gothenburg City, Mölndal City, and Härryda) - there is such an RPO of relevance for climate adaptation planning. The *Göteborg Region Association of Local Authorities* (GR) is an inter-municipal association, jointly established by 13 municipal governments (total population 950 000 equalling 10 % of Sweden's population). The 13 members have empowered the GR to coordinate major infrastructural planning in the GMA. The GR Steering Group for Environment and Social Structure assists municipalities on metropolitan-scale issues and provides written comments on all new local Master Plans. Among the jointly adopted GR documents, the “Structural vision” (*Strukturbild*) is of particular relevance. It calls for (a) protecting the qualities of the coastal areas, (b) maintaining and safeguarding “green wedges” in the intersection between urban and countryside/green areas, and (c) safeguarding the multiple qualities and functions of the Göta River, all with special attention to climate change impacts (GR 2008). The “Communications 2020” (*K 2020*) concerns adaptation through its recommendation to develop housing and commercial developments around easily accessible nodes to reach the objective that 40 percent of all person transports within the GMA should be collective by 2020 (GR 2009).

The CABs are to make sure that municipal master plans fulfil all legal demands on coverage, coordination with other actors, and demands for interest participation and public hearings stated in the PBL. It should be particularly noted once again that CAB's scrutinize how municipalities clarify how their Master Plans might affect neighbouring municipalities, regional development programs, county-wide plans for transport infrastructure, regional climate and energy strategies, and national environmental quality (PBL Ch. 2, 3§). Among other things, the municipalities in the Västra Götaland Region should state how their plans relate to the VG CAB's formulation of regional energy and climate change-related objectives, as well as to the climate objectives agreed upon with the popularly elected Västra Götaland Regional Council.

It should be noted that both the PBL and the Environmental Code also cover planning that relates to the use and management of water resources. Water administration in Sweden has long been divided between various institutions at the different regional levels, though the main actors in long-term water planning have been

(and still are) the 290 local municipalities, governed by locally elected politicians. This planning regime does not, however, correspond to the natural geographic boundaries of water as represented by the 119 major catchment systems in Sweden. The Västra Götaland CAB (where the Mölndalsån catchment area is situated) has issued a handbook – “Stigande vatten” – to assist local planners dealing with flooding and erosion scenarios. The recommendations are adapted to the different challenges confronting coastal, inland and littoral municipalities (VG CAB 2011).

With the advent of the EU Water Framework Directive (WFD), a new system for water administration was established in parallel with the municipal planning system. Based on the idea that the drainage areas should govern the zoning divisions under the WFD, Sweden has been divided up into five water districts, each draining into one of the major sea basins surrounding Sweden. There is a Water Authority (*Vattenmyndigheten, VA*), for each water district, charged with putting the regulations under the WFD into practice. The practical planning tasks are mainly carried out by drafting committees (*beredningssekretariat, BS*), hosted by one of the CAB's bordering on the neighboring water district. For many of Sweden's 119 river catchment areas, specific Water Councils have been formed which are inter-municipal in character. They are thus spatially rational as they follow water divides and transcend municipal and regional boundaries. The Water Council of the Mölndal River is of special interest to the Swedish GOVRISK contribution, since that council has been very active in proposing and implementing a comprehensive system of hydraulic water flow management along the course of the Mölndal River.

The overarching goal of water management under the WFD is to achieve adequate water status by 2015 or by 2027 at the latest. Adequate status involves adequate ecological and water chemistry status in all inland and coastal waters. For groundwater this means – apart from water chemistry status – adequate quantitative status by 2015. The Water District of relevance to the selected research area for the Swedish part of the GOVRISK project is the *Skagerrak and Kattegat Water District*, whose Water Authority is hosted by the Västra Götaland CAB. This water authority suggested water quality norms for all types of water bodies to be achieved by the end of 2015 or – in some cases – by the end of 2021. These norms were

then formally issued by the VG CAB by the end of 2009 (VG CAB 2009). They have the legal status of environmental quality norms under the Environmental Code, and will thus be of utmost importance for the climate adaptation planning at the regional and municipal level. The lakes, water courses and creeks within the river catchment of the Mölndalsån are also covered by these norms (see VG CAB 2009, Appendix 2, pp. 17-18).

## 4.6 Responsibility for climate change adaptation

The responsibility for local adaptation is split between the three tiers of government. At national level, several agencies and other actors have responsibility within their respective sectors. Among these are the Swedish meteorological Institute, SMHI, which runs a knowledge center for climate adaptation. No single entity has an overarching responsibility for measures and efforts. At regional level, the CAB (Länsstyrelse) are tasked with coordinating the efforts within the region. Still, the main decisions about measures and implementations are left to the municipalities. The responsibility for adaptation is linked to both comprehensive planning, land use, preparedness and contingency and technical infrastructure. Owners of private property are also expected to make adequate precautionary measures.

## 4.7 Insurance against Damages from Flooding, Cloudbursts other Climate-related Events

### 4.7.1 Nordic Insurance Industry and Weather-related Damages

The Nordic insurance associations presented a report in 2013 called *Weather related damage in the Nordic countries* – from an insurance perspective. The report is both an account of historical trends and experiences and a recommendation for clearer roles of public and private actors. The report revealed that some insurance companies no longer want to offer insurance cover for certain claims. Furthermore, the report said there is an increase in conflicts and



disputes between home owners, insurers and municipalities due to unclear laws regulating the liability - especially in Norway and Sweden. It showed that the insurance cover differed among countries, as does the legal basis. Regulation of water damages are spread among several acts which may cause disputes.

When discussing responsibilities of different actors - state/ municipalities/ home owners - the insurance companies first state that they “cover the incident and not the recurring incident” (*italics LJJ*). This means that the burden of responsibility may lie on the claimants, if it can be reasonably argued that they have not made sure their preventive actions are satisfactory, or that the damage is the result of negligence on the part of the claimant. The insurance companies thus argued that the state should ensure a national strategy with a clear division of responsibilities and provide local governments with incentives to make them assess their risk of flooding and increase their capacity for action and their arsenal of measures. The insurance associations also admonished the municipalities to react before the damage occurs and that they calculate solutions and drawbacks of different solutions and make the best choice from a socio-economic point of view. Home owners should be provided with incentives to handle water on their property to prevent damages.

It is evident that the insurance industry regards the municipalities as a key actor. “How well are the municipalities prepared for the climate adaptation task? Do the municipalities have the sufficient tools to solve the challenge – and do they know how to go about the task?” (Nordic Insurances Association 2013:9).

#### 4.7.2 Climate-related Damage Insurance in Sweden: A Volatile Business

Together with Great Britain, Sweden is the only country in Europe to have a standard clause in standard comprehensive company policies to cover flooding, including non-natural water damage, flooding, storm surge, water from lakes and streams, as well as uprising sewage from pipes and pits. In 2011, compensation for damages from flooding in rivers, dams and lakes cost insurance companies around 150 MSEK annually. This is to be compared with costs of water damages caused by leaking pipes that amounted to around 3 600 MSEK annually. Usually, such damage

compensations are paid out to property owners be they individuals or companies.

The crucial question for this project is how local governments can act so as to evade becoming liable for damages caused by flooding or water and sewage incidents. First of all, the 2011 Nordic report indicates that as responsible for master and detail planning, municipalities are the ultimate decision-makers when it comes to allow the development on pieces of property. This means that local governments can deny or allow development in places prone to flooding, decisions that become legally binding if they are included in the detail plans. Municipalities are also responsible for sufficient dimensioning of sewage pipes or liable the pipes are insufficient in any other way. Due to the Water Service Act and precedents following from court decisions, the municipality is furthermore responsible for back-flow in sewage system.

Property owners that have suffered losses from flooding may allow insurance companies to enter into their rights as claimants. If this is the case, the insurance company has to prove that the damage caused by water entering the individual's property was caused by deficiencies in the municipal water and sewage services, e.g., a backflow from the drainpipe. Should the insurance company present satisfactory evidence that this is the case the municipality can evade liability only if it manages to prove that the pipes were adequately dimensioned and maintained. The 2013 Nordic report concludes that "the liability for the municipality is close to strict" (Nordic Insurance Associations 2013, Part 7).

Swedish municipalities can take out insurance policies to protect the health and wellbeing of their school children, their personnel and their property. An overview of some larger municipalities' home pages indicates that they all do this. But against the background on insurance and water damage liability, can municipalities take insurance policies to ease their close-to-strict liability? There is no easy answer to this question, or the question of what happens if the municipality does not a) make sure that its plans for development are built on satisfactory evidence with respect to best available knowledge on future climate scenarios, and/or b) does not hold on to the prescriptions for property use laid down in the legally binding detail plans.

There have been statements from some leading people in the insurance industry to the effect that projected future risks of flooding may force the companies to rethink their policies. Already in 2011, a leading person in one company said that "in Sweden, we must start thinking about how we should adapt to climate change. We may have to apply stricter conditions on housing close to lakes. And why should municipalities compete for the lowest water and sewage charges – is that the most prudent way to go? For even if all insurance companies want to continue offering good protection at reasonable prices, both banks and insurance companies may have to think more than twice when lending money or insure new projects that entail too great risks in a climate perspective" (Nordisk försäkringstidskrift 2011).

Both individual companies and the branch organization – *Svensk försäkring* – seem to have increased their campaigns to make governmental levels, private business and individual property owners aware of the need to adopt climate adaptation plans and to take appropriate action. In August 2014, *Svensk försäkring* announced that it might be "difficult for the insurance sector to offer insurance policies against flooding damage. This would particularly be the case for areas with recurring incidents of damage from flooding and inundation. At the same time, local governments were urged to improve their plans for climate adaptation. Two months later, the insurance company *Länsförsäkringar* launched a research program of 12 MSEK to learn more about Sweden's history of extreme weather events, municipal responsibilities for planning and building in locations close to waters, and the role of municipalities in cooperation with other actors. Another part of the research program will concern peoples' attitudes and behavior in relation to climate risks. The objective is to increase knowledge about risk attitudes and behavior and peoples' willingness to pay for climate insurance (Länsförsäkringar 2014).

As can be seen from this short overview, the Swedish arena of insurance against climate-related damage is presently somewhat volatile. Municipalities show quite different patterns with respect to the state of their climate adaptation planning, and sometimes also in their practices towards building and development in "risky" areas. On the other side, insurance companies are increasingly worried about what they see as a) future increases in claims for

damage compensation as “weather-related events” become more frequent and more intense, and b) lacking municipal awareness, capacity and action in relation to climate risks and adaptation to avoid such risks.

## 5 Comparative perspective: Differences and similarities in the institutional conditions for local adaptive capacity

### 5.1 Comparing the three countries: similarities and differences

The institutional context of the processes of translation and transmission of climate knowledge between social levels and actors is a crucial factor that condition uptake of climate information and knowledge in local planning. The institutional context is also of utmost importance when comparing different systems as it gives understanding of similarities and differences across cases. We will concentrate the institutional comparison on Germany, Sweden and Norway's system of government; the allocation of climate adaptation responsibility; the level of local autonomy in each country; and relevant planning levels and plans as shown in the table below. Then we will discuss how these different institutional frameworks seem to influence the local climate change adaptation work in the three countries.

Table 5.1: *Overview of institutional framework*

<b>Adaptation governance</b>	<b>Germany</b>	<b>Sweden</b>	<b>Norway</b>
<b>System of government</b>	Four-tiered federal state (federal government-regional states-districts-municipalities)	Three-tiered unitary state (state-region-municipality)	Three-tiered unitary state (state-region-municipality)
<b>Responsibility for adaptation</b>	Not one dedicated national authority, a general responsibility for all. The role of local communities is emphasized	Not one dedicated national authority, a responsibility for several agencies within their sectors. The County Administrative boards (regional state) has a regional coordinating responsibility, while main decisions for measures and implementation left to the municipalities	The responsibility is shared between several agencies. Ministry of the Environment (+ the Norwegian Environmental Agency) has a coordinating responsibility. Main decisions for plans, measures and implementation left to the municipalities.
<b>Level of local autonomy</b>	Strong The subsidiary principle strongly emphasized and municipalities operate according to a "principle of voluntary implementation".	Strong Municipalities is the most important welfare providers, social developers and plan authorities	Strong Municipalities is the most important welfare providers, social developers and plan authorities
<b>Planning – regional level</b>	- Legally binding Regional plan (text and map)	- Regional plans (not-legally binding)	- Regional plans (variation, some regions have legally binding plans)
<b>Planning – local level</b>	- Non-binding preparatory land-use plan (large scale) - Binding Land-use plan (detailed, small scale)	- Non-binding master plan with goals and priorities (text) and land-use plan (map of all the territory), - Binding zoning plans (map of municipal districts)	- Non-binding master plan with goals and priorities (text) - Binding Land-use plan (map of all the territory), zoning plans (map of municipal districts)

*System of government and level of autonomy:*

Germany is a federal republic with a parliamentary system of political representation at four tiers (federal government-regional states-districts-municipalities), while Sweden and Norway are three-tiered unitary states (state-region-municipality), all popularly elected. As a federal state, Germany put strong emphasis on the subsidiary principle.

When it comes to level of autonomy the German subsidiary principle states that governance challenges or political decisions should be dealt with at the most immediate (or local) level consistent with their solution, i.e. as local as possible. The German constitution guarantees municipalities the right to independent self-government (Article 28), which reflects the subsidiary principle. This leads to a politico-administrative system in which the responsibility to decide about concrete investments or implement "measures" resides mostly with the local level (the *Gemeinden*), and municipalities cannot be forced into implementing a certain measure (which is called the "principle of voluntary implementation", or „*Freiwilligkeitsprinzip*“). However, municipalities operate within a strong economic, political and administrative system, requiring the cooperation of all levels of government.

The autonomy of Swedish municipalities are, as their German counterparts, secured in the Swedish constitution. This is not the case in Norway. But in practice, the position of Swedish and Norwegian municipalities within the political-administrative system is similar. However, as unitary states with long traditions of state rule, Swedish and Norwegian municipalities do not operate according to a principle of voluntary implementation. Rather they reside in a system with continuous tension between being implementers of national policies and independent policy-makers. However, the two countries have a history of strong local government involvement in public policy and administration. The municipalities is the most important welfare providers, social developers and plan authorities.

*Distribution of climate change adaptation authority and responsibility*

In all countries, the local level has the main responsibility for local climate change adaptation. In Sweden and Germany, there is not one dedicated national authority devoted to climate adaptation.

Rather, there are several public authorities engaged in climate adaptation. In Norway, the Ministry of the Environment (plus the Norwegian Environmental Agency) has the overall coordinating responsibility, coordinating the many Ministries and agencies having specific responsibilities for different tasks. However, all three countries emphasize the key role played by the municipalities in operationalizing and implementing climate adaptation policies and measures.

More specifically, the main responsibilities for local adaptation is distributed in this way in the different countries.

In Norway, the distribution of responsibility for climate change adaptation follow the traditional “sector-responsibility-principle for taking environmental concerns” (Hanssen, Hovik and Hundere 2014). This implies that individual sector authorities all have the responsibility of adapting to climate change in their sector. However, some national authorities are responsible for creating necessary framework (the Agencies of NVE<sup>18</sup>, DSB, and the Ministry of Environment has coordinating role (supported by the Norwegian Environment agency). Yet there is a strong emphasis on the municipalities' role as responsible organ for executing adaptation efforts.

Germany also follow that subsidiarity principle, and municipalities are considered important for taking measures and decisions relating to climate adaptation. National action plan (2011) involving federal ministries, Länder (regional level) and non-state actors (commercial sector). Federal level responsible for funding research, and also provides financial support for adaptation efforts in municipalities. Furthermore, standards and legal norms are adjusted to support and accommodate adaptation on local level. Municipalities are responsible for task both due to transferred authority, and self-government. Adaptation is part of both categories – e.g. through construction supervision (transferred), and land use planning (self-government). However, there is no direct legal mandate to consider climate adaptation in these tasks.

On national level, environment ministry and agency coordinates cooperating between Länder – somewhat similar to the role of the

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<sup>18</sup> NVE - The Norwegian Water Resources and Energy Directorate  
DSB - The Norwegian Directorate for Civil Protection



corresponding Norwegian ministry and agency. In contrast to Norway, there are several permanent cross-departmental working groups and a standing committee. Federal and regional governments are responsible for creating conditions for local adaptation – both by municipalities, but also companies and individuals, for instance through (lack of) insurance options or disaster relief.

In Sweden, the responsibility for local adaptation are split between the three tiers of government. At national level, several agencies and other actors have responsibility within their respective sectors. Among these are the Swedish meteorological Institute, SMHI, which runs a knowledge center for climate adaptation. No single entity has an overarching responsibility for measures and efforts. At regional level, the CAB (Länsstyrelse) are tasked with coordinating the efforts within the region. Still, the main decisions about measures and implementations are left to the municipalities. The responsibility for adaptation are linked to both comprehensive planning, land use, preparedness and contingency and technical infrastructure. As a sidenote, owners of private property are also expected to make adequate precautionary measures.

Comparing these three countries, there are several dimensions that can be stressed. Firstly, Sweden and Norway seem to have a similar structure at the national level: Several agencies operate within their sector, and one agency has a coordinating role. However, they lack the interdepartmental working groups established in Germany. This indicates a rather fragmented national responsibility in climate change adaptation in Norway and Sweden.

Secondly, all the countries have placed a lot of responsibility on the municipalities. An important discussion is that of necessary competence. Even if the municipalities have the responsibility and authority (plan) over this complex task, the question is if they have enough relevant competence to be able to integrate the adaptation concern in their planning and priority of measures. In Norway, the most offensive and vulnerable municipalities have recruited geologists (among them Bergen). But few municipalities have the resources needed to do the same.

Thirdly, the role of the regional level differ. Swedish regional authorities seem to have a stronger responsibility than their Norwegian and German counterparts. However, also the German

planning regions (114) have an important role, as they are formulating the legally binding regional plans.

*Planning system (regional and local)*

There are several important differences in the planning systems of the different countries, which might influence the climate adaptation work.

In Norway, the highly autonomous municipalities are the formal land-use authorities formulating the mandatory legally binding land-use plans. The regional level is weaker, with voluntary regional plans which are not binding. The regional and national authorities can raise formal complaints (*innsigelse*) against plans in conflict with significant national and regional interests, but are now instructed to reduce the use of this tool (by national government).

In Sweden, the main planning authorities are the municipalities, with mandatory Master plans (*översiktsplan*) – including optional Detailed master plans (*fördjupad översiktsplan*). This seems similar to the Norwegian system, where the main plan is mandatory, but can be specified in more detailed plans. However, contrary to the Norwegian Master plan, the Swedish Master plan are not legally binding. Thus, it more closely resembles the German non-binding Preparatory plans. Detailed development plans are used for areas being developed, and are legally binding. On regional level, planning is more sectoral (i.a. related to the WFD), but also some places handled by special Regional Planning Organizations. Such RPOs can for instance be established with the intention of coordinating the planning along a river. The Norwegian system has a somewhat comparable system, which is called inter-municipal planning cooperating. However, the Norwegian system does not produce separate plans, but rather coordinate relevant municipal plans

In Germany, the planning system is described as vertically integrated, consensus-oriented system for spatial planning (referred to as a process of reciprocal influence "Gegenstromprinzip"). Higher levels provide guidelines within which lower levels make detailed plans. The regional level (114 planning regions) have more authority than in Norway and Sweden. They have the authority to formulate "*Regionalplanung*", which aims at specifying and implementing the sectoral targets formulated at *Länder* level and

integrating these into a comprehensive, legally binding planning document, the *Regionalplan*<sup>19</sup> (also consisting of a textual and a map part). Thus, the regional level serves as a link between the *Länder* and local level planning (BMVBS 2010, Akademie für Raumforschung und Landesplanung 2005). At local level, there are two types of plans: non-binding preparatory plans (on a larger scale) and binding land-use plans (detailed) – parallel to Norway's master plans (*kommuneplanens arealdel*) and zoning plans (*reguleringsplan*). There also exist different sectoral plans (*Fachpläne*) for transportation, utilities etc) which seems related to the Norwegian societal part of municipal plans (parallel to *tematiske kommunedelplan*) – these provide input to the spatial planning.

## 5.2 Short discussion: What are the implications for the ability of integrating climate change adaptation concerns?

In comparing the institutional framework in the different countries, is to have a multi-level perspective on the planning systems when discussing the ability to integrate a cross-sector perspective as climate change adaptation concerns. What is most interesting, is the role of *the regional level*. The regional level in Germany, the level of juridical binding *Regionalplanung*, is considered to be the most relevant governance level for coordination and mediation between different (and diverging) sectoral planning interests, is crucial (Schüle 2013, Biesbroek et al. 2010, Bundesregierung 2008, Greiving 2010). Here, there is an explicit focus upon themes relevant for climate change adaptation. Climate change issues - mitigation as well as adaptation - are being introduced into spatial planning in many different ways, both directly (i.e. implicitly under the "headline" climate change) and indirectly (i.e. through existing topics, such as flood protection, renewable energies, biodiversity protection etc.).

In Norway, the regional plans are not legally binding in the same ways. Neither do all regional plans have a spatial dimension, since the PBA 2008 do not require any plans besides a regional planning

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<sup>19</sup> Depending on the *Bundesland* and the region, the *Regionalplan* is sometimes also called "regional development plan" or "regional spatial planning program".

strategy. The regions (county municipalities) that choose to have a “land-use and transport plan” often have a strong co2-reduction focus (densification, transport-oriented, traffic hubs), they to a very little degree have a focus upon adaptation themes. This is also the critic from EU of the new regional water management plans in Norway, that they to a little extent integrate the effects of climate change upon the ecological status of water (according to the EU Water Framework Directive) (Hanssen et al 2015, Barkved and Hanssen 2015). Different studies from Norway all points to the potential of the regional level of taking a more coordinating role in climate adaptation, a potential which is not used today (Hanssen et al 2013, Hanssen et al 2012, Dannevig and Aall 2015, Hanssen and Hofstad 2017). One of the explanations is that the planning system does not allow for strong guidance by regional plans, as they are not legally binding upon the land-use of municipalities. Thus, the regional level has lower legitimacy of formulating strict guiding principles for municipal land-use (Hofstad and Hanssen 2015, 2016, Hanssen and Hofstad 2017). This is a dilemma in ensuring climate adaptation concerns, as the effects of climate change is often natural hazards that cross municipal borders. However, this does not fully explain why the regional level in Norway have not integrated climate change adaptation more in their plans.

In Sweden, the planning system allows for more hybridity, as most regional plans are not legally binding, while some are.

Thus, while regional planning is crucial for climate adaptation in Germany through the binding regional plan. In Norway and Sweden, the local level is most important. In Norway, the municipalities are highly autonomous in land-use planning, with some formal guidelines and regional and national authorities can raise formal complaints (*innsigelse*) against plans in conflict with significant interests. While Norwegian municipalities can develop legally binding land use plan that covers all the municipal territory, German and Swedish municipalities can make judicially binding land-use/zoning plans for parts of the municipality. In Germany, local planning is a two-fold process, involving two spatially explicit plans: a non-binding preparatory land-use plan (*Flächennutzungsplan*), which identifies allowed future land uses on a bigger scale (according to projected needs), and a more detailed binding land-use plan (*Bebauungsplan*), which addresses only those areas planned for growth, on a small scale. The *Bebauungsplan* must

conform with the *Flächenutzungsplan*, and is binding for private landowners and developers.

The fact that Norwegian municipalities can make legally binding land use plans that covers all the municipal territory can strengthen the municipalities' ability to have a comprehensive adaptation perspective on their land-use. However, we see from our survey that only half of the municipalities under 20 000 inhabitants report they have integrated it in their land-use plans, while 77 percent of larger municipalities report the same (see Hanssen, Hofstad and Winsvold 2017).

### 5.3 GOVRISK – the way ahead

The research-project GOVRISK will use this report as the point of departure for the empirical studies and discussions. We need to conduct empirical studies to illuminate whether or not the institutional conditions described in this report stimulate, or hinder, local adaptive capacity more than others.

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