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GoApply



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**GoApply - Multidimensional Governance of Climate Change Adaptation
in Policy Making and Practice**

Climate Adaptation Governance in the Alpine Space

Transnational Synthesis Report (WP1)

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1. Introduction

This report is a deliverable of the project [GoApply](#) – Multidimensional governance of climate change adaptation in policy making and practice. GoApply responds to challenges, barriers and gaps related to multilevel governance that currently all Alpine countries are facing in their efforts to implement their national adaptation strategies in practice. The project aims to strengthen capacities for the governance and implementation of climate adaptation across multiple levels and sectors. In doing so, it pursues mutually reinforcing objectives in four interlinked work packages. This report is the final project of work package 1 (WP1). It is a transnational synthesis of the results of the four nationally focused country reports by the project partners from Austria (Lexer et al. 2018), Germany (Lange et al. 2018), Italy (Cetara et al. 2018) and Switzerland (Pütz et al. 2018). All individual country reports are available at the [project website](#).

The goal of GoApply WP1 was to strengthen capacities for multilevel climate adaptation governance in the Alpine space. To this end, all project partners mapped and analysed the national governance systems (structures, actors, processes) in place for implementing adaptation strategies across levels and identified strengths and weaknesses, success factors and barriers (Activity 1.1). All project partners also compiled good practice examples of effective climate adaptation governance (Activity 1.2) as well as explored and developed enhancement options and innovations (Activity 1.3).

This synthesis report compares the key findings from all four country reports to allow learning, lesson-drawing, detecting institutional bottlenecks, highlighting transferable success stories, and identifying joint critical challenges, enhancement opportunities and governance needs. To facilitate such comparisons, all project partners followed a common methodology. The methodological framework is annexed to this report; in addition, key definitions and concepts are also outlined in this synthesis report. Additionally, the results of the national adaptation governance mappings were visualized and are available online in the form of an interactive visualization. This format allows the viewer to more easily access and explore the data we collected and enables a more intuitive understanding of the mapping results. The visualizations are available [here](#).

1.1 Structure of the report

This report is structured as follows: It begins with a short introduction and sets the stage by explaining important definitions and concepts. Next, it shortly discusses important international climate adaptation policies. We go on to discuss and compare the results of the national mappings, collections of good practice examples and compilations of important barriers and success factors. To avoid needless repetition, keep the synthesis brief and increase the reliability and transferability of our results, this report focuses on remarkable commonalities and differences revealed by the comparison of the four country reports as well as cases that seem especially important. While we discuss some possible explanations for these commonalities and differences, the primary value of this approach is the insight gained regarding universal influential factors and the different methods of dealing with them. These insights are reflected in our comparison of barriers and success factors as well as in the conclusions we draw from them. The report concludes by summarizing lessons learned and policy recommendations that should be applicable to all Alpine countries. Finally, we shortly discuss the transferability of our results.

The common methodology used in the creation of all four country reports as well as a compilation of all the good practice examples are available in the annex.

2. Definitions and conceptual framework

2.1 Governance of adaptation to climate change

Adaptation to climate change is not just a matter of technological solutions but also of governance. This project understands adaptation to climate change as a multilevel challenge requiring multilevel governance arrangements. Focusing on national governance systems this project also addresses governance at the subnational and international levels. Climate change impacts and respective responses cut through different administrative levels as well as through various sectors and policy fields. Governance of adaptation to climate change deals with some special challenges such as uncertainties, long time scales, the cross-cutting nature of adaptation affecting many societal and economic sectors, and differences in actors' perspectives. Considering the multilevel character of climate adaptation governance different governance functions at different levels can be distinguished (Bauer/Steurer 2014): National governments and international organisations such as the EC are expected to raise awareness, set up adaptation policies (incl. strategies and action plans), provide general frameworks and guidance on how to adapt to climate change, and (co-)fund adaptation projects. Sub-national governments (e.g. Bundesland, Kanton, and municipalities) are expected to handle the detailed planning and implementation of adaptation policies, and to mediate between national and local actors.

Governance of adaption to climate change raises normative questions, e.g. who has to be responsible. According to common principles of good governance practice, climate adaptation governance has to be transparent, fair, inclusive, accountable, responsive, equitable, accessible, effective, and coherent (Lockwood 2010; EC 2001).

In order to build this work package on a common understanding of key terms and to refer to the current scientific literature (e.g. Knieling 2017, Okereke et al. 2009), we propose the following definition of governance of adaptation to climate change, short: climate adaptation governance.

Climate adaptation governance is defined as the structures, processes and interdependencies that determine how actors (from public administration, politics, science, business and civil society) make decisions, share power, exercise responsibility, and ensure accountability regarding adaptation to climate change. Climate adaptation governance is about the horizontal interplay of sectors and the vertical interplay of policy levels. Climate adaptation governance requires mandatory (formal) and voluntary (informal) cooperation between actors, across sectors and across policy levels and is regionally specific and context-sensitive. The term "climate adaptation governance" in GoApply covers both, adaptation to climate change and to climate variability.

2.2 Mapping the governance of adaptation to climate change

Mapping the governance of adaptation to climate change means identifying and visualizing the most relevant climate change adaptation activities. To this end we conceptualize governance as an interplay of policies, measures, actors and knowledge and visualize their interactions. This mapping addresses the following questions:

- 1) Who or what implements which policies and measures?
- 2) Who or what informs which policies, measures and actors?
- 3) Who decides, funds and monitors which policies and measures?

The different items to be mapped are defined in the common methodology as follows (For more information, see the common methodology in the annex):

- **Policies** include laws, regulations, strategies, concepts, action plans, pilot programmes, and funding schemes. Policies comprise both actual climate adaptation policies and sectoral policies with climate adaptation goals (climate mainstreaming). Usually, policies can be identified as policy documents. While particularly relevant sectoral policies that are inclusive of climate adaptation concerns may be included in the mapping as well as in the visualization, the focus of this report is on dedicated (stand-alone) climate adaptation policies only.
- **Measures** include all activities, actions, initiatives, procedures, and events implementing adaptation. Measures can be designed for both one sector only or as multi-sectoral (or cross-sectoral) measures. Measures can be voluntary or mandatory, individual cases or regular routines, innovative or standard procedures. Measures include both 'hard' measures (e.g. building flood protection dams) and 'soft' measures enabling, facilitating, and supporting actors in actually implementing 'hard' measures (e.g. communication activity, awareness-raising campaign, establishment of regional adaptation service centres, instalment of local adaptation managers). The mapping and visualization include all measures which are explicitly involved in the implementation of the mapped dedicated (stand-alone) climate adaptation policies.
- **Knowledge** can be explicit/implicit, cognitive/operative or experimental. Knowledge is provided by basic and applied research including climate scenarios, impact analysis, risk analysis, vulnerability analysis, tools and decision support systems, as well as web pages, clearing house or climate service centres. Knowledge is produced or used by actors as defined below. Actors might have different knowledge resources available resulting in knowledge asymmetries or even knowledge gaps between actors.
- **Actors** can be individuals and collectives (incl. organizations, agencies, working groups, networks), and include actors from public administration, politics, research and science, business and industry, and civil society. Mapping actors includes identifying their position (role, function, mandate, responsibility), resources, interests, and goals.

2.3 Barriers and success factors

Barriers and success factors for climate change adaptation were a key focus of the case studies conducted in WP1. Barriers and success factors are influential factors that either hinder or support the development and/or implementation of climate change adaptation related policies or measures. For the development of enhancement options and policy recommendations, it is essential to answer the questions: (i) what influential factors do exist, (ii) how do they matter in what contexts, and (iii) how can they be optimally managed, i.e. how can barriers best be overcome, and how can supportive factors be built upon?

2.4 Policy Cycle concept

The Policy Cycle is a simplified model of the policy process which divides it into several stages. The concept was first introduced by Lasswell in 1956 but has since been adopted and revised by several others, including Anderson in 1975, May and Wildavski in 1978, Jenkins in 1978 and Brewer and de Leon in 1983 (Sabatier et al. 2014). The most common versions today usually distinguish five stages: Agenda-setting, policy formulation, decision making, implementation and evaluation. As the name policy cycle implies, it is usually assumed that the policy process doesn't end at evaluation, but rather that evaluation leads to the recognition of new need for action, to iterative agenda setting and to starting the cycle anew.

The policy cycle model is relevant to this report because the mapping process soon revealed that the four countries participating in the project are at different stages of the policy process. Naturally, this impacts the selection of cases and good practice examples, the currently most relevant barriers and success factors and the lessons learnt that can be drawn from each country report. As such, when discussing the comparison of the national mappings, we will also analyse what stage in the adaptation policy process each country is currently at and how that impacts their findings. To this end, we apply the policy cycle model.

3. Results

3.1 Mapping of adaptation governance

3.1.1 International policies

In 2013, the European Commission adopted an EU strategy for adaptation to climate change (EU 2013). Its primary aims are to make Europe more climate-resilient by increasing the capacity of all governance levels to respond to the impacts of climate change. The strategy focuses on three key objectives:

- 1) Promoting climate adaptation by member states. This objective is pursued by encouraging member states to formulate national adaptation strategies and providing funding for concrete actions. Additionally, it supports adaptation on the municipal level through the Covenant of Mayors for Climate and Energy initiative.

- 2) Promoting climate adaptation at EU level by climate-proofing key vulnerable sectors such as agriculture, fisheries and cohesion policy.
- 3) Promoting better informed decision-making by addressing gaps in knowledge about adaptation and further developing the European climate adaptation platform (Climate-ADAPT).

An evaluation of the EU adaptation strategy was published in November 2018 focusing on lessons learnt and possible improvements to be made for future actions. The evaluation found that while progress had been made regarding every major objective of the strategy, Europe is still vulnerable to the consequences of climate impacts both within Europe and beyond. As such, it has become clear that adaptation regarding projected temperature changes and their impacts must become a staple of international climate action supplementing efforts to mitigate the emission of greenhouse gasses.

The Paris Agreement (UN 2015) is an accord between the 196 countries being parties to the United Nations Framework Convention on Climate Change (UNFCCC) ratified in 2015. As the successor of the Kyoto Protocol, the agreement primarily concerns climate change mitigation. However, it also recognizes climate change adaptation as an important second pillar of climate policy. In particular, Article 7 of the Paris Agreement establishes “the global goal on adaptation of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change”. To achieve these goals, the agreement requires all signing parties to engage in adaptation planning and implementation as appropriate, for example, by formulating national adaptation strategies and plans and conducting vulnerability assessments, monitoring and evaluation, etc. The agreement also stipulates that climate adaptation is to be conducted in a transparent way and that priorities, plans, actions and support are to be communicated clearly and publicly.

Another important UNFCCC outcome concerning climate change adaptation is the Nairobi Work program (NWP) established in 2005 at the United Nations Climate Change Conference in Quebec (UN 2005). The NWP supports adaptation policies and practices through the development and dissemination of relevant information and knowledge. Its key functions are:

- 1) Engaging a network of non-Party stakeholders in sharing their experience and expertise.
- 2) Capturing and synthesizing the latest information and knowledge on key adaptation issues.
- 3) Enhancing the science-policy-practice interface to close identified knowledge gaps.
- 4) Disseminating knowledge and fostering learning to boost adaptation activity by all stakeholders.

The NWP’s Network consists of over 360 partners including public entities, research institutions, representatives of the private sector as well as non-governmental organizations regional networks and organizations affiliated with the United Nations. While the NWP primarily aims to support least developed countries and small island developing states, it serves an important role regarding the development and dissemination of adaptation knowledge for all UNFCCC partners.

The impacts of climate change are particularly strong in the Alpine region. Average temperatures have already risen by 2°C compared to the 19th century (Auer et al. 2014; Gobiet et al. 2014) and are expected to rise another 2-3°C during the next 30 years (CH2018 2018).

Beyond the EU Adaptation strategy, also a macroregional EU strategy is in place in the Alps. The EU Strategy for the Alpine Region (EUSALP) covers 7 seven countries (all except Monaco) and 48 regions, mostly overlapping with the Alpine Space Programme except at the northernmost periphery. EUSALP is a transnational strategy process that builds on two key documents: A Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions (EC 2015a) and an action plan (EC 2015b). The goal of EUSALP is to identify major challenges and opportunities for the region and to provide a framework to address them. The strategy recognizes “climate change and its foreseeable effects on the environment, biodiversity and living conditions of the inhabitants [of the Alpine Region]” as one of five major challenges affecting the Alps. The implementation of the EUSALP is organised in 3 thematic objectives and 9 thematic Action Groups. Allocated to thematic objective 3 “environment and energy” and bundled together with risk management, adaptation is one of two core topics within EUSALP Action Group 8 “To improve risk management and to better manage climate change, including major natural risks prevention”. The EUSALP Action Plan encourages, among others, the development of an Alpine adaptation strategy and action plan, based on a comprehensive vulnerability assessment and in line with the existing national adaptation strategies, as well as the implementation of a disaster risk management policy at the macro-regional level. Under its current work programme, AG8 focuses on the stocktaking of risk governance structures for Alpine natural hazards in the EUSALP countries, policy recommendations for dealing with residual risks from extreme events and situations of overload, good practice examples for enhanced coherence between natural hazard management and climate adaptation, and on building a knowledge base about forest fire risk in the macro-region.

The Alpine Convention (1995), a multilateral international convention of the Alpine countries and the European Union dedicated to the protection and the sustainable development of the Alps, has tackled climate change issues in various ways over the years: In 2006, the Alpine Conference adopted a Declaration on Climate Change (Alpine Convention, 2006), further concretized in the Climate Change Action Plan adopted in 2009 (Alpine Convention, 2009), addressing both mitigation and adaptation. Taking action on climate change is one of 6 priorities of the multi-annual work programme 2017-2022. The Contracting Parties, the Observers, and the thematic Working Bodies of the Convention are regularly working on cross-sectoral aspects of adaptation and have produced a range of specific transnational outputs, including statements and guidelines, workshops, and experimentation projects, often contributing to implementation of actions laid down in the Climate Action Plan. Prominent examples of such work results include the ‘Alpine strategy for adaptation to climate change in the field of natural hazards’ (2013) and ‘Guidelines for climate change adaptation at the local level in the Alps’ (2014). Additionally, in 2016 the Alpine Convention established an Alpine Climate Board, mandated with bundling information on existing initiatives and measures addressing climate change in the context of the Alpine Convention and with developing a concrete set of objectives on climate action, in cohesion with relevant European and international goals and agreements. A first synthesis report on “Stocktaking as basis for defining activities of the Alpine Climate Board” has been published in 2017. The Alpine-wide Climate Target System on climate-neutral and climate-resilient Alps has been submitted to the high-level bodies of the Convention, to be approved by the Alpine Conference of Ministers in April 2019. Overall, the integration of adaptation into the Alpine Convention and

its related treaty-based processes has strengthened transnational adaptation efforts in the Alps (EEA, 2014).

3.1.2 A comparison of national policies

The cornerstones of the national efforts to adapt to climate change in all four analysed countries are the national adaptation strategies, or, in the case of Switzerland, the Adaptation Strategy of the Federal Council, as well as the corresponding adaptation action plans. Interestingly, in the cases of Austria, Germany and Switzerland, there is only an indirect or even no legal basis for these adaptation strategies.

The 2011 revisions of the Swiss CO2 Act institutionalize adaptation to climate change as the second focus of the Swiss climate policy complementing climate change mitigation. The law mandates the federal state to coordinate climate adaptation activities and to provide the foundation for it. The 2012 revisions to the CO2 Ordinance specify that the Federal Office for the Environment (FOEN) is responsible for the coordination of climate adaptation activities, including those measures taken by the cantons, while the cantons are to regularly report on their progress regarding climate change adaptation to the FOEN. The Adaptation Strategy of the Federal Council justifies itself as a necessary foundation for climate adaptation activities in Switzerland and thus mandated by the CO2 Act. However, this is at best an implicit legal mandate.

In Austria, there is no dedicated regulatory framework that stipulates policy making and implementation of climate adaptation. The Austrian adaptation strategy is merely anchored as a goal in the work programmes of the Austrian federal government. The development of the strategy was an explicit goal of the work programme for the period 2008-2013, while its implementation and evaluation was an explicit goal of the work programme for the period 2013-2018. The new work programme for the period 2017-2022 makes no explicit mention of the strategy anymore. Instead it references coping with the impacts of climate change in the context of several sector-related goals. This could be seen as a sign for the successful mainstreaming of adaptation goals, but a more pessimistic interpretation might also see this as a sign of the eroding importance of the adaptation strategy for the current government. The constant need for the re-evaluation and reaffirmation of the importance of the adaptation strategy is certainly one disadvantage that comes with the absence of a formal legal mandate. Another consequence is that due - to the lack of legislative mandate - the adaptation strategy and the measures recommended therein are not legally binding. Thus, the implementation of the strategy is reliant on soft measures and soft pressure as well as the adherence of involved parties to non-binding agreements. As a result, Austrian adaptation policy-making on all levels is dominated by informal, cooperation-oriented governance modes and coordination formats.

In Germany, climate adaptation was first considered at the national level in the climate protection program 2005, a report by the interministerial working group for CO2 reduction. The program proposed the development of a national adaptation strategy. The strategy was developed under the lead of the Ministry for the Environment (BMU) and finalized in 2008. Just like in Austria, no national legislative anchoring for the adaptation strategy exists in Germany. For its mandate, the strategy instead refers to the climate protection program and international conventions and agreements such

as the UNFCCC and the preparations for an EU adaptation strategy, which were ongoing at the time. With its comparatively early adoption of an adaptation strategy, Germany has taken on a pioneer role in the Alpine Space, as the Austrian and Swiss adaptation strategies were only adopted in 2012, and the Italian adaptation strategy was finished in 2015.

The Italian adaptation strategy on the other hand refers to a wide legal and policy base for its mandate: As the most recent of the national adaptation strategies analysed in this report, it refers to a range of EU directives and regulations, including the call for national adaptation strategies issued by the EU adaptation strategy. Beyond this international basis, the Italian adaptation strategy is based on numerous pieces of sectoral national legislation formulating mandates which are bundled by the adaptation strategy and to be fulfilled by its implementation. Furthermore, the strategy refers to the responsibilities of the public bodies involved with the implementation, supervision and assessment of adaptation measures within Italy to legitimize the need for a national adaptation strategy.

Germany and Switzerland followed a similar approach for the formulation of their adaptation strategies: The strategies were jointly developed by a coalition of members from different ministries and federal offices under the lead of the Ministry for the Environment (BMU) and the FOEN respectively. In contrast, the Austrian adaptation strategy was developed in a process that was simultaneously more and less inclusive. Rather than sharing the responsibility for the development of the strategy between the different members of interdepartmental working groups, the Federal Ministry of Agriculture, Forestry, Environment, and Water Management (BMLFUW) was solely politically responsible for the development of the strategy. On the other hand, the process was characterized by the extensive participation of representatives from federal ministries, the states, organized interest groups, NGOs, and other institutions. Overall the participatory development processes of these strategies were arguably a key condition for their success and have laid the fundament for the implementation process through their voluntary, cooperation-based approaches (Prutsch et al. 2018; Lexer, Stickler & Prutsch, 2013). Lastly, the Italian adaptation strategy was based on a two-fold approach: A broad, transparent participative process seeking to encompass the needs of stakeholders from civil society, the scientific community and the private sector and a top-down process including representatives of ministries, regional and local governments as well as a large panel of scientists.

All four adaptation strategies are based on the principle of mainstreaming adaptation into existing policies, rather than introducing new policies focused exclusively on adaptation. This explains why all countries made sure to include representatives of all sectors affected by the impacts of climate change in the development process.

All four adaptation strategies also include action plans that elaborate how the goals formulated in the strategies can and should be implemented. Notably, the Swiss action plan exclusively concerns measures to be taken by the federal offices. This is because the Swiss adaptation strategy is not actually a national adaptation strategy but rather the adaptation strategy of the federal council – meaning it's a strategy for federal institutions. It is worth noting however, that one of the measures proposed by the Swiss action plan was the execution of a multisectoral pilot program adaptation. Said pilot program was co-financed by several federal agencies and subsidized 31 pilot projects, many of

which took place at the cantonal or municipal level or somewhere in between. As such, it can be argued that the implementation of the Swiss action plan actually went beyond the federal level.

Contrary to the other three countries, Germany has already developed a second action plan. Where the first German action plan mainly focused on enabling individuals, companies and policy-makers to include climate-related factors in their planning and decision-making processes, the updated second action plan focuses on concrete actions and measures of the federal government similar to the Swiss example. A third adaptation action plan is currently in development and will be agreed on as part of the Second progress report of the German adaptation strategy in 2020.

The Austrian action plan presents a catalogue of 136 adaptation options (recommendations for action) within 14 sector-related activity fields. These recommendations for action address a broad range of implementing actors on all levels. As they do not actually formulate a mandate, the Austrian action plan seems more akin to the first German action plan than the second German action plan or the Swiss action plan.

The Italian action plan is primarily meant to serve as a tool for the implementation of the adaptation strategy by enabling public bodies at any administrative level, who have the responsibility or the will to do something to tackle climate adaptation. It contains information on climate scenarios and vulnerabilities based on model macro-regions that serve to illustrate expected climate impacts for each Italian region. These projections have been used to identify possible adaptation actions and synergies between bordering administrative units. Beyond that, the action plan presents adaptation actions, the role of public organisations and stakeholders for their implementation and provides an estimation of the needed resources and possible sources of finance. Lastly, it contains instruments to foster participation and proposes a method for the systematic monitoring and assessment of adaptation implementation. As such, while the action plan does indeed discuss what actions should be taken and by whom, it doesn't formulate a legally binding mandate to actually perform these actions either.

As the discussion of the national adaptation strategies and action plans illustrates, the four countries compared in this report didn't all start the climate adaptation process at the same time and don't necessarily progress at the same pace either. Germany has already gone full circle: the implementation of their first action plan is largely finished. Its success has been evaluated, weak points and policy gaps have been identified, and a second action plan has been developed and is currently being implemented. A comprehensive evaluation of the second German action plan is ongoing and will be included in the next progress report. Austria is only a little bit behind: A monitoring report by the BMLFUW on adaptation implementation progress, climate impacts and changes in level of resilience was finished in 2015. Based on this progress report, the Austrian national adaptation strategy and action plan have been updated, and the new versions were adopted in 2017. Switzerland on the other hand is currently in the process of implementing their action plan and beginning to evaluate and redesign some early adaptation measures. For example, the Swiss pilot program has entered its second phase as of 2018. Italy on the other hand is only now entering the implementation phase of its adaptation strategy and action plan. Naturally, this has influenced the possible selection of case studies and thus the influential factors identified in each country. As a result, the success factors and bar-

riers found in the case of Italy are somewhat difficult to compare with the results from the other countries, because they're less focused on specific projects or the implementation of adaptation measures, but instead more generally concerned with the development of the adaptation strategy and action plan.

3.1.3 A comparison of regional policies

The proliferation of climate change adaptation has led to the development of regional adaptation strategies or the incorporation of adaptation goals into existing regional climate strategies in all Austrian and German states. Regional adaptation policy in Switzerland is lagging somewhat behind: Out of 26 cantons, 18 reported to the FOEN in 2015 that they'd engaged the topic of climate adaptation multisectorally. 13 of these cantons were working on or had already finished a cantonal adaptation strategy and/or action plan in 2015. The regions of Italy are further behind still: The Lombardy was the first Italian region to adopt a comprehensive climate adaptation package including both a strategy and an adaptation planning document. The regional adaptation plan was ratified in 2016, following the adoption of the regional adaptation strategy in 2014.

Seeing as Austria and Switzerland developed their adaptation strategies on the national level more or less simultaneously, the differences between those two countries regarding the progress of regional adaptation bears further inspection. The proliferation of regional adaptation policies seems to have progressed significantly faster in Austria. The main reason may simply be that the Swiss adaptation strategy of the federal council was primarily meant to address federal institutions. This is also reflected in the corresponding action plan, which primarily describes measures to be taken by federal institutions. On the other hand, one key objective of the Austrian adaptation strategy was to serve as a framework for the development of regional adaptation strategies. This goal was actively pursued by conducting more than 20 dialogue events in states and regions with a special focus on engaging state administrations. Additionally, representatives of state governments were heavily involved in the development of the national adaptation strategy, which further served to sensitize them to the topic and prepared them for the formulation of regional adaptation strategies.

3.1.4 A comparison of key actors

The differences in target groups between the national adaptation strategies are easily discernible in the mappings of important actors: The Swiss report primarily lists the interdepartmental committee group that paved the way for the multisectoral cooperative development of the Swiss adaptation strategy as well as the federal departments and agencies that were involved in the creation of the strategy.

While the German adaptation strategy was spearheaded by an interministerial working group as well, the German mapping also prominently lists a standing committee for the adaptation to climate change impacts. Said committee is responsible for providing information to the federal government and the federal states and coordinating their respective climate adaptation activities. The committee is part of a working group that belongs to both the federal and the regional governments. Beyond

that, the German mapping also lists several further networks concerned with the proliferation of data and know-how, mainstreaming, monitoring and evaluation efforts regarding adaptation to climate change. While some of these networks include solely federal actors, others follow the explicit goal of connecting actors from the national and regional level. It needs to be pointed out that the mapping in the German case focused on the national level; a detailed, multi-level description of the complex German adaptation governance landscape across all political and territorial levels was beyond the scope of this work package.

The important actors listed in the Italian mapping reflect the objective of the Italian action plan to serve as a tool for the implementation of adaptation actions across sectors and administrative levels. The national adaptation strategy provides a list of stakeholders to be involved in adaptation. This list includes institutions and government bodies, regions, provinces, municipalities; citizens, consumers, civil society, NGOs, business associations, trade associations and representatives of industry and the media. The national adaptation plan goes even further into detail regarding specific target groups. Additionally, it makes special note of the board for interregional coordination. Said board collects feedback from the regional level to be taken into consideration in the development of national adaptation policy and supports actors on the regional and municipal level in the implementation of adaptation measures. All regions are mandatorily represented on the board.

Lastly, the Austrian mapping of actors depicts the breadth of the consultation phase included in the development of the national adaptation strategy as well as their focus on proliferating adaptation onto the regional level: Beyond the former BMLFUW (now Federal Ministry of Sustainability and Tourism BMNT) and the Environment Agency Austria (EAA), which lead the development of the strategy, the mapping prominently lists:

- The conference of state environmental ministers (LURK), which includes the members of the nine state governments in charge of environmental affairs as well as the Minister for Sustainability and Tourism. The conference is held yearly and renowned as trend-setting for national political decision-making, once again demonstrating the importance of the regional level for Austrian politics.
- The National Climate Protection Committee (NKK) with representatives of all significant political parties and national ministries, all federal states, all relevant business, industry, trade and energy associations as well as representatives from science and NGOs.
- The climate coordination officers of the federal states who are responsible for the development and implementation of regional adaptation policy as well as the coordination of vertical and horizontal cooperation. The climate coordinators of the states and the federal government hold annual consultation meetings, forming the so-called Conference of Climate Coordinators of the Federal States (LKRK).

Interestingly, despite all these differences and the fact that most countries chose a cooperative, multisectoral approach for the development of their adaptation strategies and action plans, the process was still lead by environmental ministries or agencies in all countries. This demonstrates that, regardless of the multitude of sectors impacted by climate change and despite the strong focus on natural

hazard management in most adaptation strategies, climate adaptation still seems to be viewed as predominantly under the purview of environmental authorities.

3.2 A comparison of good practice examples

All four partners have identified some sort of funding program for adaptation measures at the local or regional level as a good practice example: The Austrian KLAR! model region program, the Baden-Württemberg Support Program to compile Municipal Heavy Rain Risk Management, the Swiss Pilot Program Adaptation to Climate Change and the Italian CARIPLO foundation. The success and importance of these programs exemplifies two things: Concrete measures need to be calibrated to fit local conditions, needs and preferences, thus they usually take place at the local level and benefit from bottom-up approaches to priority setting. At the same time, local administrations are often starved for resources and need financial and strategic support in order to take on any additional tasks beyond their usual workload. It is interesting that the Italian example of a funding program is a privately financed foundation rather than a government funding program. However, this might simply be explained by the fact that Italy hasn't progressed far enough in the implementation of their adaptation strategy for national activities to be evaluated and deemed good practice examples yet.

Overall, most good practice examples stress the importance of good vertical and horizontal cooperation and reaffirm the common division of labour in federal systems: The national level acts strategically by informing, funding and coordinating measures; subnational levels act more operatively by executing concrete measures.

However, the Austrian good practice examples seem to especially prioritize vertical cooperation. The working group on 'Self-Responsible Risk Precaution' is meant to mainstream climate adaptation into risk management but also serves to intensify cooperation between national and federal administration, as does the training program for adaptation advisory services in municipalities. Interestingly, both vertical cooperation initiatives are aiming at capacity-building at the local level. Organizing vertical cooperation is also an important task of the national and state-level climate coordination officers. In comparison, the German and Swiss good practice examples more heavily stress horizontal cooperation, and especially the cooperation between the national and the state level receives less attention. The Italian good practice examples present instances of both good vertical cooperation and good horizontal cooperation in the form of successful mainstreaming of adaptation goals. One possible explanation for these differences may be the different legal mandates for the regions we discussed earlier: The Swiss cantons are mandated by law to report on their progress to the FOEN, which implies that they are to make progress if they want to avoid the embarrassment of not having anything to report on. The Austrian federal states on the other hand are not actually mandated by law to do anything. As the Austrian country report puts it: "implementing adaptation is in essence a voluntary task without legal obligations. This explains to a large extent the strong role of informal, cooperation-oriented, «soft» governance modes and coordination formats that predominate Austrian adaptation policy-making." This focus on cooperation-oriented governance modes especially regarding vertical cooperation is also reflected in the Austrian selection of good practice examples.

3.3 A comparison of barriers and success factors

A comparative analysis of the barriers and success factors to climate change adaptation found across all case studies shows that a significant number of the most relevant factors are equally important in all participating countries. Valuable insight can be gained by analysing the ways the different countries handled these factors. These different approaches shine through in what interviewees perceived as the most relevant success factors and barriers. These are factors which have in similar form been identified as relevant in most or even all countries and often in several case studies within individual countries. Depending on the exact context and the way they have been handled, they have alternately been described as success factors or barriers. We've tried to reduce these factors to the underlying issues – the questions that are at the core of all these influential factors. For each issue, we then summarize some major barriers as well as promising approaches to deal with the issue that have been recognized as success factors. In the subsequent conclusions, we will exemplify some of our findings by elaborating different approaches to solutions from different countries and the lessons learned from these different approaches.

How to organize horizontal cooperation?

- Many members of the administration, especially on the regional and local level, have little to no experience in or understanding of how best to cooperatively develop a multisectoral strategy.
- Traditional conflicts between sectors may stand in the way of fruitful cooperation.
- Members of the administration may resent being under the authority of their peers from other sectors.
- + Project-based cooperation can be helpful in integrating actors from various levels and sectors.
- + Being able to build on previous experiences with climate policy or other prior cooperation or existing networks helps.
- + Cooperative development of a strategic framework and distribution of responsibilities may help in overcoming traditional rivalries between sectors.
- + Coordinating agencies taking on organizational duties for other sectors without taking on an administrative role may help to keep cooperation going smoothly by lowering the workload for participating sectors without challenging their sovereignty.

How to organize vertical cooperation? How can adaptation on the regional and local level be promoted?

- For various political reasons, there are little to no direct legal mandates for regions or municipalities to engage in climate adaptation in any analysed country.
- The lack of legislative mandate means that the national level needs to rely largely on soft measures or funding measures to reach the regional and local level.

- It is difficult to reach unwilling or disinterested recipients with soft measures.
- Lack of awareness for climate adaptation options or lack of capacity in the implementation of climate adaptation is often a problem on the regional or local level.
- + Using well-established cooperation and communication channels or existing networks to promote climate adaptation.
- + Involving representatives of lower administrative levels in strategy development processes ensures the utility of the strategy across levels and builds awareness and know-how at lower levels.
- + Assessing local needs and involving all relevant local stakeholders from the start increases the acceptance of adaptation projects.
- + Correctly identifying and addressing local issues is key to getting local stakeholders involved.
- + Strategic frameworks developed on the national level may serve as guidelines for regional climate adaptation and as motivation or justification for local climate adaptation.
- + The existence of strategic frameworks on higher levels legitimizes adaptation measures on lower levels.
- + Combining soft pressure generated by awareness raising measures and the development of a strategic framework with economic incentives is a good way to promote adaptation at lower levels.

How to deal with a lack of awareness for climate adaptation or a lack of political will to engage in climate adaptation across levels?

- Due to the omnipresent reliance on soft measures to promote climate adaptation, effective action often depends on the personal awareness, expertise and motivations of important stakeholders or members of the administration.
- Political issues with short-term consequences and solutions may take priority over climate adaptation.
- Awareness of the problems generated by the impacts of climate change and possible solutions are often limited to selected members of the administration.
- Past experiences with extreme events may have led to one-sided priorities.
- + Problem pressure generated by recent extreme events can generate political pressure to engage in climate adaptation.
- + It is important to optimally utilize “policy windows”, short windows of opportunity for pushing climate adaptation policy opened up by extreme events or policy developments in related fields.

- + The personal engagement of motivated stakeholders or members of the administration regularly is one of the most important success factors for climate adaptation.
- + Beacon projects can serve as examples and inspiration.
- + Projects in neighbouring countries or participation in international networks can provide good practice examples and support awareness-raising.
- + It can be an advantage to incrementally convince possible partners for climate adaptation. Having secured the support of a party may help in convincing others to join in.
- + Producing concrete products or obvious adaptation benefits helps in spreading awareness and convincing stakeholders.

How to deal with the prevalent lack of personnel and monetary resources available for climate adaptation?

- The comparatively low political priority of climate adaptation makes it difficult to secure funding for adaptation programs or measures that don't produce obvious monetary benefits.
- Many local or regional administrations simply do not have the resources to establish dedicated positions for climate adaptation.
- Existing administration bodies are in many cases already overworked and thus very hesitant to take on additional tasks.
- + Taking advantage of synergies whenever possible helps to save resources. The broad, multisectoral impacts of climate change can be of advantage here, as they open up many possible avenues for synergies to be exploited.
- + If adaptation measures provide clear and immediate benefits, convincing people to dedicate resources to them becomes much easier.
- + Integrating adaptation measures into ongoing structural development processes helps to save resources and can pave the way for mainstreaming adaptation into other sectors.

How to deal with widespread uncertainty about how best to begin engaging in climate adaptation?

- In many cases, clear, locally fitted data on climate scenarios, vulnerability and possible measures are still unavailable. Beyond that, existing data is often not readily accessible or understandable for local personnel or its existence isn't communicated well enough.
- Stakeholders at the local or regional level may be unaware of relevant laws, strategic guidelines or existing support options for adaptation measures.
- The multisectoral impacts of climate change often generate uncertainty about who should take on which tasks.

- + The pilot project format enables project-based cooperation as an easy starting point for cooperative approaches and offers the freedom to try different options.
- + Successful pilot projects in other municipalities, regions or even countries may to an extent serve as inspiration and guidelines.
- + Scientific data, support tools, capacity-building measures and strategic frameworks produced or financed by the national level can be a huge help.
- + Communication and awareness raising measures by higher levels need to ensure that the relevant information reaches all administrative levels.

Generally speaking, the Italian results are somewhat difficult to compare with those of the other countries because Italy currently stands at a different point in the policy-cycle regarding climate adaptation. Consequentially, many of the influential factors identified in the Italian case studies concern a higher conceptual level or an earlier point in the policy-cycle than those commonly found in the other countries. For example, the Italian report outlines the importance of basing local adaptation measures on vulnerability assessments and climate scenarios as closely tailored to the local conditions as possible - an influential factor which calls for data at the finest spatial resolution possible. The worth of regional climate scenarios and nationally funded research on climate data in general was also recognized as an important success factor in Austria, Germany and Switzerland - a fact demonstrated by an abundance of adaptation measures with the goal of producing regionally or even locally fitted data. However, it almost seems like some interviewees took the availability of such data for granted or that it wasn't actually that important to the success of concrete adaptation measures, as they didn't mention it as a success factor of note. On the other hand, in the Swiss cases of Biel or the Parc Ela, the lack of local climate and vulnerability data was recognized as an important barrier. Another factor to be considered is that the supposed lack of research or data can always be used as a convenient excuse for inaction even when the real barriers may lie elsewhere. As the Austrian report has found, local stakeholders are usually sufficiently aware of the major local vulnerabilities without conducting sophisticated scientific research. They propose that the real barrier is that existing knowledge is not prepared or communicated well enough to reach local interest groups.

There are other examples of success factors found in the Italian case studies that certainly don't contradict the results from other countries, but could be construed as being taken for granted in some cases: Paying particular attention to sectors found to be most affected or at risk by climate change, or aligning adaptation policy with existing legislation are things that all countries do, but weren't always explicitly mentioned. The other influential factors identified in Italy can mostly be reduced to one of the omnipresent factors discussed above.

4. Conclusions

4.1 Lessons learned

As one would expect based on the prevalence of universal influential factors, many of the major lessons learnt in each country are similar to those drawn in other countries. The existing differences can largely be explained by the different approaches that were chosen regarding the development, the primary target audience and the implementation of the national adaptation strategies and action plans. The Austrian country report, for example, repeatedly stresses the participatory development of the Austrian adaptation strategy as well as the close cooperation between national and state government actors as important success factors for regional adaptation. Many of the more unique lessons learnt from the analysis of the Austrian cases are centred around these success factors. Examples include the inclusion of regional representatives in development processes at the national level, the important role of regional adaptation coordinators, or the value of strong central coordination. The Swiss adaptation strategy, on the other hand, was primarily meant to address national institutions. As such, there was no inclusion of cantonal representatives in the development of the strategy, and the lessons drawn from the process focus largely on how to successfully coordinate horizontal cooperation. In the absence of strong cooperation between the national level and the cantons, the development of cantonal initiatives in Switzerland may have been more heavily reliant on the engagement of key stakeholders within these cantons, which is reflected in the lessons learnt from the Swiss analysis. This may explain in part why different cantons have so far made very heterogeneous progress regarding climate change adaptation. However, one mustn't forget that the smallest Swiss cantons are much smaller population-wise than even the smallest of the Austrian states, and thus they have a very different amount of resources at their disposal. Still, as both Austria and Germany have recognized the importance of regional adaptation agents for driving adaptation action on the local level, it may be worthwhile for Switzerland to engage more heavily with those cantons where adaptation has so far enjoyed little political attention.

In the end, actual adaptation measures with transformative character and direct benefits have to take place primarily at the local level. Thus, the true challenge regarding vertical cooperation seems to lie in how exactly to promote concrete adaptation measures on the local levels, which is reflected in the lessons learnt from all four country reports. Some universal conclusions regarding this challenge are the following:

- The motives and willingness to act of local stakeholders and members of administration are key for the actual implementation of adaptation measures. Thus, the role of the national and regional level should largely consist of providing a clear strategic and legal framework, necessary scientific data and usable information as well as funding.
- To reach local stakeholders it is important to understand local priorities, interests and stakes and to adjust communication strategies appropriately. This calls for climate scenarios and vulnerability data at high spatial resolution. However, it is just as important that existing data is prepared and communicated in such a way as to be accessible for local interest groups.

- It is important to include all relevant stakeholders in participative processes to avoid resentment.
- In order to optimally handle the often low political priority of adaptation issues on the local level, it is important to take advantage of policy windows opened up by extreme events or ongoing legislative processes. This in turn necessitates prior preparation of adaptation policy.
- By prioritizing issues that currently have political support, one can pave the way for later, broader adaptation measures. It may be prudent to avoid issues likely to be met with controversy early on, so as to not stall the adaptation process before it can even begin.
- In the absence of a binding legal framework, some municipalities have begun engaging in climate adaptation of their own volition. However, such engagement has so far largely been spotted and limited to larger municipalities. Relying on external problem pressure to trigger action on the local level is not sufficient and liable to produce one-sided, maladaptive outcomes. If solidifying the legal framework for adaptation is politically unfeasible, the national and regional levels are required to provide a foresighted, empowering and facilitating strategic framework for adaptation at the very least.

Further universal lessons learnt focus on the pilot-project or model-region format as a medium for early adaptation action. For various political reasons, the four analysed countries resemble each other in that there is no concrete legislation forcing subnational entities to engage in climate adaptation in any of them. In the absence of such binding legislation forcing uniform measures, early adaptation measures have mostly been implemented on project basis. This process has produced remarkably similar insights in most analysed cases:

- A project-based approach is the optimal context for issue-based cooperation between sectors, levels, actors or entities with little to no prior experience of working together. This experience can later be solidified and lead to long-term partnerships.
- Pilot projects are a good way of approaching the topic of climate adaptation, which is still riddled by many uncertainties regarding optimal procedures. They allow room for experimenting with creative solutions without being inhibited by fear of failure.
- Adaptation projects need to produce direct, visible results in order to raise awareness of and increase acceptance for climate adaptation. Such project results can serve as examples and guidelines for other projects even beyond national borders.
- Integrating adaptation measures into ongoing development processes such as construction projects, research projects or informative measures on a project basis paves the way for mainstreaming adaptation efforts into the day-to-day work of traditional sectors. For this to work, the people responsible need to be able to ensure that project results are anchored in local policy or standard processes in some way.

4.2 Policy recommendations

Based on our comparative analysis of influential factors and lessons learned in all four countries, we can formulate some universal policy recommendations. In order to optimally implement the universal lessons learnt, good governance of climate adaptation should strive to follow these tenets:

- The lack of a clear legal mandate for the local level to engage in climate adaptation as well as the resulting uncertainty about what exactly constitutes key adaptation activities are a major issue impeding the progress of adaptation implementation. Thus it would be beneficial if the national and regional level could provide such clarity by way of a corresponding legal mandate. One possible method to achieve the creation of such legislative recommended by the German country report might be to anchor the national adaptation process – that is to say the regular evaluation, redevelopment and implementation of national adaptation action plans – in national law. The hope is, that the regional level would follow the national example and create corresponding regional laws, adaptation strategies and action plans, which would then apply to the local level. However, such an approach is tailored to the German political system and would have to be majorly revised to possibly be applied in other Alpine countries.
- If the creation of clear legal mandates and guidelines for the local level to engage in climate adaptation is politically infeasible or otherwise unlikely, the national and regional level should focus on providing a clear strategic and legal framework, necessary scientific data, guidance and support tools and funding. Additionally, the higher levels should focus their attention on capacity-building and awareness-raising efforts. Communication activities are key and need to be fitted to the local context and needs. These efforts should strive to take advantage of existing formal and informal networks across administrative levels for communication purposes.
- One option to ensure local administrations engage in climate change may be to follow the German example by having the national level provide funds for the employment of regional and local climate change coordinators. Alternatively, regional and local adaptation coordination functions could also be integrated existing structures, such as those responsible for climate mitigation or sustainable development. However, the success of this second option would once again depend on the personal commitment and attitudes of the people responsible for these tasks.
- Local adaptation should focus on concrete implementation activities and projects to start.
- Local adaptation processes need to ensure the participation of relevant stakeholder groups.
- Whenever possible, adaptation measures should be integrated into ongoing development processes to save resources and pave the way for mainstreaming efforts.
- The people responsible for implementing adaptation projects need to be able to ensure that project results are properly followed up. Adaptation processes need to be sustained and anchored in policy for the long-term somehow in order to progress beyond punctual, one-sided adaptation.

- Climate adaptation and mitigation should be approached in concert and seen as complementing each other rather than be played off against each other.
- Administrations need to be ready to take advantage of political windows of opportunity by preparing prospective adaptation policies in advance.
- Municipalities should foster exchange regarding climate adaptation between each other and across national borders.

4.3 Transferability of results

The transferability of results is always a big issue for social sciences, and doubly so in regards to results that are largely based on case-study work. In the common methodology for GoApply WP1, we therefore made a point of including the climate adaptation governance mappings with the explicit objective of gaining a comprehensive overview of adaptation activities in the Alpine space and to put our case-study results into context. Additionally, this transnational synthesis has tried to carve out commonalities between the four analysed countries and to reduce them to their underlying common issues or universal influential factors, as we have called them. In this way, we have produced results that should be generally applicable within the Alpine space, and maybe even beyond in countries with similar political and economic backgrounds. Our final result are selected lessons learned and policy recommendations to be taken into account when planning the future of climate adaptation in the Alpine space.

5. References

Alpine Convention 1995: Alpine Convention - Framework convention.

Alpine Convention 2006: Declaration on climate change. (ACIX/07/1), Alpine Convention.

Alpine Convention 2009: Action Plan on Climate Change in the Alps (ACX/B6)., AC - Alpine Convention.

Auer I et al. 2014: 'Vergangene Klimaänderung in Österreich', in: Österreichischer Sachstandsbericht Klimawandel 2014 [Austrian assessment report 2014] (AAR14), Verlag der Österreichischen Akademie der Wissenschaften, Vienna, Austria, pp. 227–300.

Bauer A, Steurer R, 2014: Multi-level governance of climate change adaptation through regional partnerships in Canada and England. *Geoforum* 51 (2014) 121–129.

BMLFUW – Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft 2012a: The Austrian Strategy for Adaptation to Climate Change. Part 1: Context. Adopted by the Council of Ministers on 23rd October 2012.

BMLFUW – Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft 2012b: Die Österreichische Strategie zur Anpassung an den Klimawandel. Teil 2: Aktionsplan. Handlungsempfehlungen für die Umsetzung. Vom Ministerrat am 23. Oktober 2012 beschlossen.

BMNT – Bundesministerium für Nachhaltigkeit und Tourismus 2017a: Die Österreichische Strategie zur Anpassung an den Klimawandel. Teil 1 – Kontext. Aktualisierte Fassung, Jänner 2017. Vom Ministerrat beschlossen am 22.08.2017.

BMNT – Bundesministerium für Nachhaltigkeit und Tourismus 2017b: Die Österreichische Strategie zur Anpassung an den Klimawandel. Teil 2: Aktionsplan. Handlungsempfehlungen für die Umsetzung. Aktualisierte Fassung, Jänner 2017. Vom Ministerrat beschlossen am 22.08.2017.

BMUB - Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety 2016: Adaptation to Climate Change - Initial Progress Report by the Federal Government on Germany's Adaptation Strategy.

Bostock M, Ogievetsky V, Heer J, 2011. D³ data-driven documents. *IEEE transactions on visualization and computer graphics*, 17(12), 2301-2309.

Bundesamt für Umwelt (BAFU), 2012: Anpassung an den Klimawandel in der Schweiz. Ziele, Herausforderungen und Handlungsfelder. Erster Teil der Strategie des Bundesrates vom 2. März 2012. Bern.

Bundesamt für Umwelt (BAFU), 2014: Anpassung an den Klimawandel in der Schweiz. Aktionsplan 2014-2019. Zweiter Teil der Strategie des Bundesrates. Bern.

Cetara L, Pregnolato M, Ballarin A, 2018: Climate Adaptation Governance in Italy. Country Report Italy (WP1). Deliverable of the Interreg Alpine Space project GoApply.

CH2018, 2018: CH2018 – Climate Scenarios for Switzerland, Technical Report, National Centre for Climate Services, Zurich.

EC – European Commission 2009: White Paper on European Governance.

EC – European Commission 2015a: Communication from The Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions concerning a European Union Strategy for the Alpine Region (COM/2015/0366 final).

EC – European Commission 2015b: Commission Staff Working Document: Action Plan Accompanying the Document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee of the Regions Concerning the European Union Strategy for the Alpine Region, No SWD(2015) 147 final.

EEA – European Environment Agency 2014: National adaptation policy processes in European countries – 2014, EEA Report No 4/2014, European Environment Agency.

EU – European Union 2013: EU Strategy on adaptation to climate change.

Gobiet, A., et al. (2014): '21st century climate change in the European Alps — A review', *Science of The Total Environment* 493, pp. 1138-1151 (DOI: 10.1016/j.scitotenv.2013.07.050).

Knieling J (Ed.) 2016: Climate adaptation governance in cities and regions. Theoretical fundamentals and practical evidence. Wiley Blackwell, Chichester UK.

Lange A, Vetter A, Ebert S, von Mach M, 2018: Climate Adaptation Governance in Germany. Country Report Germany (WP1). Deliverable of the Interreg Alpine Space project GoApply.

Lexer W, Buschmann D Strahlhofer L, 2018: Climate Adaptation Governance in Austria. Country Report Austria (WP1). Deliverable of the Interreg Alpine Space project GoApply.

Lockwood M, 2010: Good governance for terrestrial protected areas: a framework, principles and performance outcomes. *Journal of Environmental Management*, 91 (3), 754-766.

Ministero dell'ambiente e della tutela del territorio e del mare, 2015: Strategia Nazionale di Adattamento ai Cambiamenti Climatici.

Okereke C, Bulkeley H, Schroeder H, 2009: Conceptualizing climate governance beyond the international regime. *Glob. Environ. Polit.* 9: 58–78.

Pütz M, Braunschweiger D, Kuhn Belaid R, Hohmann R, Probst T, 2018: Climate Adaptation Governance in Switzerland. Country Report Switzerland (WP1). Deliverable of the Interreg Alpine Space project GoApply.

Sabatier P, Weible C, 2014: Theories of the Policy Process. Third Edition. Westview Press, Colorado.

The German Federal Government 2008: German Strategy for Adaptation to Climate Change.

UN – United Nations 2005: Nairobi work programme on impacts, vulnerability and adaptation to climate change.

UN – United Nations 2015: Paris Agreement.

Zimmermann A, Maennling C 2007: Multi-stakeholder management: Tools for Stakeholder Analysis: 10 building blocks for designing participatory systems of cooperation. GTZ.

6. Annex

6.1 Compilation of good practice examples

6.1.1 Austrian good practice examples

Name	KLAR! funding programme and KLAR! climate adaptation model regions
Level / Region (country)	Regional (20 regions)
Date (start)	2017
Description	In the current 1 st funding cycle, a total of 20 model regions, each encompassing 2 to 32 municipalities, have been selected and receive national funding in support of implementing their adaptation concepts. A service platform composed of experts from the Environment Agency Austria and the national met-service ZAMG (Zentralanstalt für Meteorologie und Geodynamik) supports the model regions with customized climate change and adaptation information packages, direct advice, and via organizing regular peer-group learning and networking meetings of all model regions. The 2 nd call for new model regions is running and will close in March 2019.
Explanation: why is it a good practice?	<p>KLAR! has been successful in setting adaptation on the agendas of participating regions and stimulating implementation of adaptation projects and measures in municipalities. Model regions have to prove coherence with the NAS and the RAS of the respective federal state and to coordinate their activities with the state climate officer. The programme supports vertical coordination by combining financial incentives with 'soft coercion', while still allowing a regional bottom-up approach to priority setting.</p> <p>Model regions have installed clear project management structures, which are usually composed of a public project executing body, the participating municipalities, a steering group, and a range of cooperating actors. Regional adaptation managers (KAM) have been appointed and receive funding; they are responsible for operative project management and coordination as well as for monitoring and reporting. KAM managers take over the role of 'change agents' in the respective region. Participating municipalities are organised in regional networks, which fosters inter-municipal exchange and peer-to-peer learning.</p> <p>The 20 KLAR!-regions cover a wide range of Austrian climatic conditions and seven out of nine Austrian federal states. In total, 218 adaptation measures have been defined. Through the national coordination and funding framework, conflicts and resistance on local level are significantly reduced.</p>
References (website, report)	http://klar-anpassungsregionen.at/klar-regionen/

Links to visualisation	<p>KLAR! funding programme: http://markjanbludau.de/goapply/#austria?KLAR! Funding Programme Climate Change Adaptation Model Regions</p> <p>KLAR! model regions: http://markjanbludau.de/goapply/#austria?KLAR! model regions [20]</p> <p>KLAR! Model Region Zukunftsregion Ennstal: http://markjanbludau.de/goapply/#austria?KLAR! Model Region Zukunftsregion Ennstal</p>
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Name	Training programme for adaptation advisory services in municipalities ['Lernwerkstatt Klimawandelanpassung']
Level / Region	National
Date (start)	2017
Description	<p>The Austrian federal states and the Federal Ministry BMNT decided to jointly finance the training programme in order to intensify the cooperation between the BMNT and the provincial governments under the umbrella of the Austrian NAS, and to jointly strengthen the support for municipalities. The Environment Agency Austria and alpS have been contracted to design, organise and implement the training. Following the “train-the-trainers” approach, the primary target group was selected staff of existing multiplier organisations. The main training goals were to enable the participants to conduct personal counselling in municipalities and to deliver process support for municipal adaptation processes.</p>
Explanation: why is it a good practice?	<p>The training programme was initiated in response to a resolution by the multilevel coordination body Conference of State Environment Ministers (LURK). As a new support offer from federal and state governments, it tackles the up-to-then almost complete lack of adaptation policies on local level. The innovation of municipal adaptation advisory services applies the recognition that successful sensitisation and agenda-setting on the local level benefits much from personalised interactions by qualified personnel in a counselling situation. In the training and in the course of the advisory visits, customized information packages, which have been informed by policy support projects under the ACRP programme and tailored to the needs of municipalities, are used.</p> <p>After completion of the training programme in April 2018, a team of qualified municipality adaptation advisors is now available and operating in each federal state. The financing role of the state governments in the training programme assures long-term political commitment, sustainability and proliferation of the advisory services. Due to the success of the initiative, a second training course is currently in preparation. It is foreseen that the municipality advisors will also receive specific training to become future on-site coordinators of the “Natural Hazards Check Climate Change, which offers considerable synergies between two measures targeting municipalities.</p> <p>Carried out by the federal ministry and the Austrian state governments in order to support municipalities, the training programme represents a form of ‘living practice’ and a ‘cloud</p>



	point' of multi-level adaptation governance. It is in the frame of such concrete projects that cooperation across levels (and sectors) is truly needed, really materializes, thrives and can become effective.
References (website, report)	http://www.klimawandelanpassung.at/ms/klimawandelanpassung/de/kwa_politik/kwa_oessterreich/
Link to visualisation	Training programme for adaptation advisory services: http://markjanbludau.de/goapply/#austria?Training_programme_for_adaptation_advisory_services_in_municipalities (%22Lernwerkstatt_Klimawandelanpassung%22)

Name	Working group on 'Self-Responsible Risk Precaution' under the Conference of Provincial Environment Ministers (LURK AG) + "Climate Check Natural Hazards" tool for Austrian municipalities
Level / Region	Miscellaneous (cross-cutting) & local
Date (start)	2017
Description	<p>The LURK AG was founded in response to a resolution of the multilevel coordination body Conference of the State Environment Ministers (LURK) which called for intensifying the cooperation between national and provincial administration to implement cross-cutting measures of the NAS. The adaptation coordinators of the federal ministry and the state governments decided jointly to focus on the topic of "self-responsible risk precaution", which is addressed in the NAS and RASs of the states. Members of the group are climate coordinators of the federal ministry and the state governments, flood risk and natural hazard management officers of federal and provincial administrations, plus representatives of the insurance industry, academia and the Environment Agency Austria. Consequently the LURK AG is both, a tool of horizontal governance between the spheres of natural hazards and adaptation, and a tool of vertical governance between national, federal, and municipal institutions.</p> <p>The tool "Climate Check Natural Hazards" for municipalities represents the direct output of the LURK AG. Its goal is to function as a sensitisation, consulting and advisory instrument to support municipalities in strengthening their risk preparedness. The tool consists of a set of 33 indicators, translated in easily understandable questions that evaluate the level of municipal risk preparedness. The group has also developed an implementation concept and a governance model for the country-wide launch of the measure. This governance structure shall become operational in the course of 2019.</p>
Explanation: why is it a good practice?	The LURK AG represents a newly created multi-level and cross-sector cooperative process format that aligns actors from the national level and state levels representing the two policy fields climate adaptation and natural hazard management. The group entered a completely new stage of adaptation policy counselling by developing a tool for municipal guidance which displays substantial added value in comparison to existing instruments, as well as a useful complement to them. Moreover, it was deliberately and explicitly established to

	contribute to implementation of the NAS and to enhance coherence between the both involved policy fields. The preceding LURK resolutions are an important strategic support and provide legitimization for adaptation actors on all levels. The LURK AG has great potential to serve as a role model for the future implementation of further complex adaptation measures that require close vertical cooperation.
References (website, report)	https://www.wien.gv.at/umweltschutz/lurk.html
Link to visualisation	<p>Working Group “Self-Responsible Risk Precaution” (measure): http://markjanbludau.de/goapply/#austria?Working_Group_on_Self-Responsible_Risk_Precaution - Measure</p> <p>Working Group “Self-Responsible Risk Precaution” (actor): http://markjanbludau.de/goapply/#austria?Working_Group_on_Self-Responsible_Risk_Precaution - Actor</p> <p>Natural Hazards Check Climate Change: http://markjanbludau.de/goapply/#austria?%22Climate_Check_Natural_Hazards%22_for_Austrian_municipalities</p>

Name	ÖKS15 – Climate Scenarios for Austria
Level / Region	National + regional
Date (start)	2016
Description	Jointly financed by the federal ministry BMNT in partnership with the nine federal states, the ÖKS15 climate scenarios represent the so far most detailed analysis (spatial resolution: 1 x 1 km) of past and future climate change in Austria. The scenarios are based on best available historical data and climate simulation data by 13 EURO-CORDEX models, and they apply the concept of representative concentration pathways (RPCs) by the IPCC. Results include climate projections for a business-as-usual-scenario (RCP8.5) and a climate mitigation scenario (RCP4.5) for the periods 2021-2050 and 2071-2100 as well as quantification of likelihood and statistical significance of projected trends. Regionalised climate scenarios have been produced for all federal states. Presentation of results has been optimized for the needs of decision-makers.
Explanation: why is it a good practice?	The joint procurement by the ministry and all state governments is in itself a successful example of multilevel cooperation in a federal state system. With the ÖKS15, for the first time a homogeneous and commonly accepted climate scenario database is available for entire Austria. Since 2016, they inform basically every adaptation policy and measure in Austria, including implementation of the national and state-level adaptation strategies, the adaptation activities in the KLAR! model regions, and the work of the municipal adaptation advisors. The climate modelling data are available at the Climate Data Centre of the CCCA for further research and more detailed regional climate impact assessments. Customized

	<p>information products for regions and municipalities that have been prepared include climate change fact sheets for each KLAR! model region and regional climate impacts maps for all states, which are used by regional adaptation managers and municipality advisors in their communication work.</p> <p>These products use tailored visualisation formats that have been co-designed with stakeholders. The scientific information has been vividly prepared and uses eye-catching and easy-to-understand graphic, which fosters creating personal affectedness, imaginations and feelings in local actors, and therefore helps adaptation policies to be taken serious.</p>
References (website, report)	https://www.bmvt.gv.at/umwelt/klimaschutz/klimapolitik_national/anpassungsstrategie/klimaszenarien.html
Link to visualisation	http://markjanbludau.de/goapply/?#austria%C3%96KS15 - Climate Scenarios for Austria 2015

Name	Climate Coordination Officers of the federal state governments
Level / Region	Regional
Date (start)	
Description	The provincial climate coordinators are the institutionalised professional intermediaries for adaptation governance between different levels, sectors and other federal states. Primarily responsible for the development and implementation of adaptation strategies on state level, they are the main agents of vertical coordination and cooperation towards national as well as regional and local levels. Furthermore, in fulfilling their task they are in charge of horizontal coordination within the state governments and administration. Their tasks comprise both climate mitigation and climate adaptation policies
Explanation: why is it a good practice?	<p>The establishment of institutionalised central adaptation coordinators in the state administrations is a key success factor during all stages of the adaptation policy process and an indispensable prerequisite for cooperation between levels. The instalment of public climate change coordinators in the administration of all federal states as well as the incorporation of climate adaptation into their responsibilities has been a crucial and necessary institutional innovation since adaptation entered the policy agenda. Apart from initiating, motivating, driving, and monitoring the adaptation process at their own level, the state-level climate coordinators are also the main agents of vertical coordination and are able to mediate between the municipal, state, and national level. Well-developed network of contacts to actors on other levels are an important prerequisite of their work.</p> <p>The state climate coordinators deliver important governance functions in terms of awareness-raising, communication, capacity-building, information provision, and efforts at persuasion. The climate coordinators are members of the Conference of Climate Coordinators of the Federal States [Landesklimareferenten-Konferenz (LKRK)], which is a (semi-)formal consultation and coordination body for climate policy making between the states and the federal ministry, and they usually prepare the decisions of the Conference of State Envi-</p>

	ronmental Ministers [Landesumweltreferenten-Konferenz (LURK)] that are relevant to adaptation.
References (website, report)	n.a.
Link to visualisation	http://markjanbludau.de/goapply/?#austria?Provincial climate coordinators of the federal states

6.1.2 German good practice examples

Name	Agency Network for Climate Change and Adaptation
Level / Region	Germany, national level
Date (start)	January 2017, establishment
Description	The agency network was established in 2017 as a permanent entity, which supports the Interministerial Working Group on Adaptation to Climate Change to implement the German Adaptation Strategy. The composition and operation of the agency network is based on its precursor the vulnerability network, which was active from 2011 to 2015. The main task of the agency network comprises the coordination of scientific content and the elaboration of the German Adaptation Strategy. At present, 22 different federal agencies and institutions are members of the agency network. The network is organized and mainly guided by the German Environment Agency.
Explanation: why is it a good practice?	The agency network represents the governance category actor and interaction due to its establishment as a permanent body and the involvement of 22 different federal agencies and institutions, which facilitate successful cross-sectoral cooperation and concerted action. Furthermore, regular meetings ensure a long-term integration of all members and a continuous exchange regarding the German Adaptation Strategy. The network contributes its scientific expertise to the development of the central products of the DAS (e.g. monitoring report, vulnerability analysis and action planning) and thus supports the interministerial coordination.
References (website, report)	Project „Cooperation network of state authorities on climate change adaptation“: https://www.umweltbundesamt.de/en/topics/climate-energy/climate-change-adaptation/kompass/kompass-projects#textpart-2

Name (type)	Germany's Vulnerability to Climate Change 2015 – Vulnerability Assessment
Level / Region	Germany, national level
Date (start)	2011-2015, elaboration; November 2015, publication
Description	To analyze Germany's vulnerability to climate change an interdisciplinary vulnerability network was established in 2011. This network included sixteen federal authorities and insti-

	<p>tutes from nine ministries, which enabled the formulation of a cross-sectoral vulnerability assessment for Germany comprising specialist knowledge. From 2011 until 2015, a cross-sectoral vulnerability assessment for Germany was elaborated. It served as a basis for the progress report of the German Adaptation Strategy as well as the further development of the German adaptation policy and comprises 14 different areas of activity. The vulnerability assessment names regions and systems, which are particularly vulnerable to climate change and allows comparable assertions of climate impacts in Germany.</p>
Explanation: why is it a good practice?	<p>The vulnerability assessment is categorized as and is characterized by its nation-wide, interdisciplinary, consistent and scientific valuation of climate change impacts. Furthermore, the willingness of the participating actors to engage in cross-sectoral cooperation and their expertise entailed a successful vulnerability assessment for Germany. The results of the vulnerability assessment were used to formulate action needs for the adaptation strategy. They therefore influence the thematic orientation of many activities of the DAS.</p>
References (website, report)	<p>https://www.umweltbundesamt.de/publikationen/vulnerabilitaet-deutschlands-gegenueber-dem; https://www.eea.europa.eu/publications/climate-change-impacts-and-vulnerability-2016, p. 279 https://www.umweltbundesamt.de/publikationen/guidelines-for-climate-impact-vulnerability https://www.bmu.de/en/publication/adaptation-to-climate-change-initial-progress-report-by-the-federal-government-on-germanys-adapt/</p>

Name (type)	“KlimaStadtRaum” („ClimateCitySpace“) – Online Information Portal about Climate Change and Spatial Development
Level / Region	Germany, national level
Date (start)	2014, establishment
Description	The online information portal is provided by the Federal Institute for Research on Building, Urban Affairs and Spatial Development and it comprises current research findings as well as practical project examples from different disciplines and research areas on climate mitigation and adaptation. The provided information and documents are publicly accessible and also comprise external sources. Furthermore, practical tools to successfully implement climate mitigation or adaptation measures are allocated. The information portal is complemented by approximately 30 short movies on climate change.
Explanation (why good practice)	The “KlimaStadtRaum” online information portal represents the governance category knowledge. The information portal bundles various information on climate mitigation and adaptation from different institutions and thereby provides a useful, publicly accessible overview of current information. Offered entries comprise specialist as well as application-oriented information. The information portal is characterized by its user-friendliness and clarity, e.g. through short movies and comprehensible summaries.
References (website, report)	https://www.klimastadtraum.de/DE/Home/home_node.html

Name (type)	Baden-Württemberg Support Programme to compile Municipal Heavy Rain Risk Management
Level / Region	Baden-Württemberg, Germany, federal state level
Date (start)	2015, start
Description	Municipalities can receive financial support from the federal state Baden-Württemberg for compiling a municipal map of heavy rain risks, a subsequent risk analysis and a proximate implementation concept. The financial support can cover up to 70 percent of the costs. Cities and municipalities identify potential local risks of flooding by means of heavy rain risk maps, which comprise three different scenarios. Such risk maps can form the foundation of developing measures to prevent flooding. The subsequent risk analysis is done by involving all local stakeholders and their specialist knowledge. Finally, the implementation concept is elaborated, which comprises different measures to manage floods. The implementation concept should be coordinated appropriate by involving stakeholders and it should be publicly accessible.
Explanation: why is it a good practice?	Heavy rain events have a high damage potential. Nevertheless, municipal heavy rain risk management has hardly been widespread to date. The state of Baden-Württemberg is the only federal state to date that supports the municipalities in their heavy rain precautions with a subsidy programme. The municipal heavy rain risk management is a largely standardized tool which is sorted in the governance categories policy and measure. It comprises three different steps. These steps all serve useful functions by identifying potential local risks of flooding, involving different local stakeholders and their expertise, and set coordinated goals and appropriate concepts to prevent and successfully manage flooding.
References (website, report)	https://www.lubw.baden-wuerttemberg.de/wasser/starkregen ; http://www4.lubw.baden-wuerttemberg.de/servlet/is/261161/

Name (type)	Municipal flood prevention at times of climate change – concept and implementation in Solingen, Germany
Level / Region	Solingen, Germany, local level
Date (start)	ca. 2015, project start; beginning of 2018, establishment of integrated drainage planning
Description	Due to an increasing risk of flooding, the technical companies Solingen established an integrated drainage planning in 2018, which mainly seeks to prevent flooding by effective and suitable drainage systems. Different sectors are working together regarding flooding, which is now seen and handled as a cross-cutting issue. To identify the areas most affected by flooding, analysis and simulation methods were developed and adjusted in 2015. Additionally, the risk potential of municipal infrastructure is assessed since 2016 and the infrastructure planning is attuned to flooding prevention since 2017. To inform citizens, the technical companies Solingen are about to elaborate an information concept, which will comprise flyer besides a website, an online survey and advisory service as well as a flood warning app.
Explanation: why is	The municipal flooding prevention concept and implementation is classified as governance

it a good practice?	category measure due to its holistic and cross-sectoral approach and the involvement of different municipal companies in flood prevention planning. Furthermore, the public is informed and warned about flooding events through different media. The municipal flood prevention concept won the „Blauer KomPass“ award in 2018, in which the German Environment Agency assigns innovative and seminal measures to enhance the adaptability to climate change.
References (website, report)	https://www.solingen.de/de/aktuelles/schutz-vor-ueberflutung/ ; https://www.umweltbundesamt.de/themen/klima-energie/klimafolgen-anpassung/werkzeuge-der-anpassung/tatenbank/kommunale-ueberflutungsvorsorge-in-zeiten-des

6.1.3 Italian good practice examples

Name	Projects for drafting & implementing the Budoia Charter
Level / Region	Italian Alps: Lombardy (Capizzzone-Valle Imagna-Varese), Friuli Venezia-Giulia (Budoia), others
Date	January 2017 - June 2019 (expected)
Description	<p>Following Alpine Convention's initiatives on climate change in the region (Climate Partnership; AC Climate Board) & the collected good practices, a project by Alpine Alliance promoted local adaptation options for municipalities across Italian Alps and the “Budoia Charter for Local Adaptation to Climate Change” (June 2017). The project sets up local labs (Lombardy; Friuli Venezia-Giulia) for implementing the Charter and supports elaboration by local authorities of SECAPs. Main activities include developing guidelines and adjusting municipal plans & regulations to achieve climate change resilience, adaptation planning and instruments.</p> <p>Main Actions:</p> <ol style="list-style-type: none"> 1. Assessment of status quo on adaptation / resilience in the lab 2. Assessment of coherency of actions to adaptation commitments from reg., nat. and supranat. sources 3. Actions & needed modifications to spatial planning tools for efficient mainstreaming of adaptation
Explanation: why is it a good practice?	In line with voluntary actions' theory and practice (UNEP 2015, Bloomberg 2017, etc.), the project supports coherent adaptation planning on the local level. It aims at homogenizing information from international (alpine guidelines & EU law), national (NAS, NAP), regional (RAD & preliminary studies in FVG) and local sources (where available) for implementing adaptation actions updated and consistent to newer climate scenarios.
References (website, reports)	https://alpenallianz.org/it/attualita/la-carta-di-budoia-adattamento-ai-cambiamenti-climatici https://alpenallianz.org/it/attualita/la-carta-di-budoia-adattamento-ai-cambiamenti-climatici/carta-di-budoia/at_download/file

Name	Project Direction: Resilient Cities in the Municipality of Milano
Level / Region	Lombardy: Municipality of Milano
Date	September 2017 - End 2020 (expected)
Description	DP Resilient Cities (DP RC) develops the local resilience plan in the frame of the charity project «100 Resilient Cities», by involving local stakeholder and sharing experiences from other cities or partners. It adopts initiatives and projects for implementing resilience measures and implements the city resilience strategy, sets up local partnerships with businesses & research centres; coordinates with other DGs and organs involved in implementing the strategy. DP RC analyses plans, programmes and other municipal projects for mainstreaming adaptation and sets up a communication strategy and the related actions in line with the municipality communication area. DP RC also work with other divisions in the municipal governments in collecting international funding for projects implementing the strategy and cooperates with external, multilevel organisations.
Explanation: why is it a good practice?	DP RC acts as a governance unit responsible for horiz. and vert. mainstreaming of adaptation and resilience policies in the largest municipality in Lombardy (and 2 nd in Italy: 1.4M inhs). The experimental & termed nature of DP RC allows for flexibility of action. DP's main function is perform and support mainstreaming of "territorial resilience" in a large city, coherently with a partnership of cities worldwide, overarching national and international rules, in cooperation with organisations on different levels and across the competences of municipal departments not consciously responsible for adaptation/resilience.
References (website, reports)	http://www.comune.milano.it/wps/portal/ist/it/amministrazione/trasparente/organizzazione/articolazione_uffici/organigramma/dp_citta_resilienti

Name	Mainstreaming adaptation in an aggregation of municipalities: Seveso - North Milano area
Level / Region	Lombardy: Municipalities of North Milano-area (8 municipalities)
Date	September 2017 - End 2020 (expected)
Description	In the frame of Life Project MASTER ADAPT on multi-level governance tools to support the integration of adaptation into sectoral policies, a case study focuses on North-Milano area (NMA): i.e. an aggregation of 8 municipalities in Lombardy Reg. (Lentate sul Seveso, Barlassina, Seveso, Cesano Maderno, Bovisio Masciago, Varedo, Meda and Desio; covering 68.6 km ²). Based on a common methodology to support subnational governments in identifying the main vulnerabilities & action priorities, and drawing up guidelines for governance of adaptation in urban areas, a vulnerability assessment is done & consistent adaptation measures are selected for the aggregation through a mainstreaming process (design + implementation) by involving different levels of government & planning (State, Regions, Local Authorities), and policies (planning, landscape, agriculture, environment, civil protection). Based on vulnerability assessment and interviews for capturing the perception on potential hazards, a list of priority interventions has been defined for NMA. The vulnerability assessment is coupled with information on planning documents and policies, as sources

	of inputs and funds for implementing adaptation measures.
Explanation: why is it a good practice?	The investigated area is between the local and regional level. It includes homogenous municipalities (notwithstanding the inherent diversity of settlements) exposed to similar hazards, but with variable vulnerabilities and sometimes non-homogenous perceptions. It also addresses the issue of funding from different levels. The project implements a strategy on a novel territorial dimension where different levels of decision makers coexist and so do planning instruments, including voluntary ones (River contracts). Vertical & horizontal mainstreaming technique are used to design & locally implement adaptation strategy/plan. The methodology and tools are transferable and replicable in other areas.
References (website, reports)	https://masteradapt.eu/wordpress/wp-content/uploads/2017/09/MA-report-A1.pdf

Name	CLIMAMI project – Climatology for professional activities and urban climate change adaptation in the Milano area
Level / Region	Lombardy: Municipality of Milano, Municipalities of Metropolitan City of Milano, Monza-Brianza Province, plus bordering municipalities in the Provinces of Varese, Pavia, Lodi
Date	Beginning 2019 – December 2019
Description	The project aims to set up a climatological information system for the wider metropolitan area of Milano including the municipalities of the Metropolitan City, of Monza-Brianza Province, and some bordering municipalities in the Provinces of Varese, Pavia, Lodi. It addresses the needs for climate data and decisions management in a well-defined area. Not limited but focusing on adaptation actions, CLIMAMI aims to provide a characterisation of local climate risks, vulnerabilities, indicators and to raise awareness on climate change and adaptation actions. A database, an atlas and guidelines on using data and indicators within different sectors will be developed in support to decision-making and to provide inputs in urban planning and management, by involving public and private stakeholders being primarily active in these fields. The project develops on a local level coherently with policy documents and adaptation measures from superior levels (regional, national and EU). CLIMAMI targets specific groups: citizens, professionals and institutions directly involved in planning and management of the territory on different levels (from the building, to the municipalitys to the metropolitan area).
Explanation: why is it a good practice?	The project is a good example of vertical mainstreaming between urban and superior territorial layers – especially the regional one. It basically aims at consolidating the currently modest link between climate-related actions implemented at different territorial levels, in the metropolitan area of Milano, in Lombardy Region. CLIMAMI looks for the harmonisation of climate information systems at different territorial levels (vertical integration) and to providing a framework for defining coherent actions in an area within the scope of application of Lombardy RAD and being object of a City Resilience Strategy under development by DP Resilience Cities of the Municipality of Milano.
Being currently References (web-	Website and platform to be set up

site, reports)	
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Name	Cariplò Foundation support to resilience and climate adaptation projects
Level / Region	Italy – focus on Lombardy and bordering provinces (Novara, Piedmont)
Date	2014-present
Description	CARIPLÒ Foundation (CF) supports and promotes innovation and social impact projects on different subjects including environment, society and science. The Foundation provides grants to more than 1000 projects per year with an average investment of 150 M €. A special attention goes to the environmental-social topic of resilience, within the Foundation priority to innovate territorial sustainable development policies and practices. Projects financed by CF and others have been collected in the National "Observatory on resilience practices" (ORP) coordinated by a group of Universities and scientific institutions. The observatory aims to collect national resilience practices, promote research and support publications on the topic, develop tools and projects for spreading resilience practices and networking of stakeholders in the field. ORP meets on a regular basis and organises a national forum per year as a place to share experiences and update on the achieved results.
Explanation: why is it a good practice?	The Observatory is the first nation-wide experience on a thorough analysis of resilience in practice. Most of the projects have a sub-regional outreach and adopt a multi-disciplinary approach. ORP facilitates comparison and sharing of practices in different fields of resilience and involves different levels of governments, and experience. Since many of the projects collected by ORP and financed by CF respond to local needs as expressed by citizens and local administrations, the CF initiative allows to streamline a local demand for adaptation and resilience and, through project development and knowledge transfer by other levels of governments or scientific bodies, promote the coherence between the territorial levels involved (vertical mainstreaming).
References (website, reports)	http://www.osservatorioresilienza.it/?set_language=en http://www.fondazionecariplò.it/it/index.html

6.1.4 Swiss good practice examples

Name	Action Plan Adaptation to Climate Change in Switzerland
Level / Region	National
Date (start)	9. April 2014
Description	The Action Plan is the second part of the Swiss Adaptation Strategy of the Federal Council. It contains a total of 63 adaptation measures spanning nine sectors and defines which federal offices are responsible for which measures.
Explanation: why is	The Action Plan constitutes a good example of successful horizontal cooperation on the federal level. The way the cooperation was organized with the FOEN moderating and

it a good practice?	streamlining the process without commanding the other offices allowed the offices involved to set aside traditional rivalries and work together to decide who'd be responsible for which challenges and measures. While the Action Plan isn't without its problems (see mapping section) its implementation overall seems to be on good track and the measures formulated in the plan are well suited to dealing with the task at hand.
References (website, report)	https://www.bafu.admin.ch/bafu/de/home/themen/klima/publikationen-studien/publikationen/anpassung-klimawandel-schweiz-2014.html

Name	Project Acclimatasion
Level / Region	City of Sion
Date (start)	2014-2016
Description	The project Acclimatasion was one of the pilot projects conducted as part of the Pilot Program Climate Adaptation. Its goal was to better adapt the city of Sion to the consequences of climate change by raising awareness of the issue among the general public, realizing concrete measures to make the city more resilient to climate related issues such as heat extremes or flooding and anchoring the project goals long-term in the operating processes of the city.
Explanation: why is it a good practice?	The project Acclimatasion was very successful thanks to its comprehensive approach and its success in taking advantage of opportunities. The project team managed to conduct several exemplary measures with relatively few resources by successfully working together with other municipal agencies as well as recognizing the potential of unrelated activities and tying in climate adaptation measures with running projects. Their success at quickly realizing concrete measures in turn contributed to make their awareness raising measures more effective.
References (website, report)	https://www.bafu.admin.ch/bafu/de/home/themen/klima/fachinformationen/anpassung-an-den-klimawandel/pilotprogramm-anpassung-an-den-klimawandel/pilotprojekte-zur-anpassung-an-den-klimawandel--cluster--klimaan/pilotprojekt-zur-anpassung-an-den-klimawandel--acclimatasion--ei.html

Name	Synthesis report on Climate Change and Hydrology in Switzerland
Level / Region	National
Date (start)	28. September 2012
Description	The project "Climate Change and Hydrology in Switzerland", colloquially known as CCHydro, was commissioned by the FOEN in 2009 to research how the water balance in Switzerland, the frequency of floods and low water as well as the water temperature might

	change by the end of this century due to the impacts of climate change. The synthesis report summarises the most important results of the project.
Explanation: why is it a good practice?	The knowledge produced by the project was an important basis for the Adaptation Strategy of the Federal Council and many of the projects implementing it. The project delivered an integral overview of all water-related impacts of climate change and formulated the knowledge gained in an easily accessible way and tailored to the needs of the praxis.
References (website, report)	https://www.bafu.admin.ch/bafu/de/home/themen/wasser/publikationen-studien/publikationen-wasser/auswirkungen-klimaenderung-wasserressourcen-gewaesser.html

Name	Interdepartmental Committee Climate – Working Group 2: Adaptation
Level / Region	National
Date (start)	14. April 2008
Description	The Interdepartmental Committee Climate was founded in order to ensure a coherent federal climate policy in accordance with the UN climate-convention. It is responsible for the coordination of federal offices concerned with climate policy from among all seven departments. The Working Group Adaptation is one of the six working groups that make up the committee.
Explanation: why is it a good practice?	The Interdepartmental Committee Climate was essential for the development of a coherent politically feasible climate strategy that included all concerned sectors. The committee laid the foundation for a fruitful cooperation between different federal agencies and allowed its members to establish working relationships with people from other agencies and take advantage of their expertise. The Working Group Adaptation especially was praised for being a very productive working environment. The foundation of the committee itself also made the statement, that the state had committed to taking the topic of climate change seriously and the same goes for the establishment of the Working Group Adaptation.
References (website, report)	https://www.admin.ch/gov/de/start/dokumentation/medienmitteilungen.msg-id-18284.html

Name	Pilot Program Adaptation to Climate Change
Level / Region	National
Date (start)	2014-2016
Description	The Pilot Program Adaptation to Climate Change was one of the multisectoral measures contained within the Action Plan Adaptation. It aimed to initiate exemplary pilot projects

	for climate adaptation and realized 31 such projects. The program was jointly financed by six federal offices who each co-funded several projects related to their sectors. The FOEN climate division was responsible for moderating the program and assisting participants with administrative tasks.
Explanation: why is it a good practice?	The program is a great example of a successful tool for policy implementation. Primarily it contributes to the implementation of the Adaptation Strategy of the Federal Council. However, one of the key arguments employed by the FOEN climate division to convince other offices and divisions to take part in the program was that they would be able to sponsor projects that would also serve to implement other obligations of theirs. In consequence the program contributed heavily to the implementation of several other tasks formulated by the Action Plan Adaptation as well as other policies beyond the Adaptation Strategy of the Federal Council such as the Postulat Walter on future challenges regarding water management and agriculture. Thanks to this approach, the program managed to realize an unexpectedly large number of exemplary pilot projects with relatively little funding.
References (website, report)	https://www.bafu.admin.ch/bafu/de/home/themen/klima/fachinformationen/anpassung-an-den-klimawandel/pilotprogramm-anpassung-an-den-klimawandel.html

6.2 Methodology

WP1 activities need input from all project partners. In order to minimize the work load requested from project partners and to operate WP1 activities as efficient as possible, one methodology covers all three WP1 activities:

- mapping and analysing climate adaptation governance (Activity 1.1),
- compiling good practice examples of effective climate adaptation governance (Activity 1.2),
- exploring and developing enhancement options and innovations (Activity 1.3).

All project partners undertake their research and analysis on country level by themselves guided by a methodology provided by BAFU/WSL. The transnational comparison and synthesis is done by BAFU/WSL.

A step by step methodology is used to map and analyse climate adaptation governance, to compile good practice examples and to develop enhancement options. Every step includes specific goals, methods and outputs.

6.2.1 Step 1: Mapping

Identify and describe the most relevant climate adaptation related policies (a), measures (b), knowledge (c), actors (d), and interactions (e). Explain for every mapped item (a-e) why you consider this to be most relevant for climate adaptation governance. We consider items as relevant, firstly, when they actually do exist, function, practice, or perform. Secondly, we consider items as relevant when they potentially come to existence or into practice, but are currently planned, underexploited or not implemented, yet.

- a) **Policy Mapping:** Identify and describe the most relevant climate adaptation related policies on national and subnational (regional, local) level for your country. Policies include laws, regulations, strategies, concepts, action plans, pilot programmes, and funding schemes. Policies comprise both actual climate adaptation policies and sectoral policies with climate adaptation goals (climate mainstreaming). Usually, policies can be identified as policy documents. Policies on the international level are identified and described by FOEN/WSL. While particularly relevant sectoral policies that are inclusive of climate adaptation concerns may be included in the mapping as well as in the visualization, the focus of this report is on dedicated (stand-alone) climate adaptation policies only.
- > **Guiding question:** Which are the most relevant climate adaptation related policies on national and subnational (regional, local) level for your country?
- b) **Measure mapping:** Identify and describe the most relevant climate adaptation related policy implementation activities. In this respect measures include all activities, actions, initiatives, procedures, and events implementing adaptation. Measures can be designed for both one sector only or as multi-sectoral (or cross-sectoral) measures. Measures can be voluntary or mandatory, individual cases or regular routines, innovative or standard procedures. Measures include both 'hard' measures (e.g. building flood protection dams) and 'soft'

measures enabling, facilitating, and supporting actors in actually implementing 'hard' measures (e.g. communication activity, awareness-raising campaign, establishment of regional adaptation service centres, instalment of local adaptation managers). The mapping and visualization include all measures which are explicitly involved in the implementation of the mapped dedicated (stand-alone) climate adaptation policies.

- > **Guiding question:** Which are the most relevant climate adaptation related policy implementation activities in your country?
- c) **Knowledge mapping:** Identify and describe the most relevant climate adaptation related knowledge resources for your country. Knowledge can be explicit/implicit, cognitive/operative or experimental. Knowledge is provided by basic and applied research including climate scenarios, impact analysis, risk analysis, vulnerability analysis, tools and decision support systems, as well as web pages, clearing house or climate service centres. Knowledge is produced or used by actors as defined below. Actors might have different knowledge resources available resulting in knowledge asymmetries or even knowledge gaps between actors.
- > **Guiding question:** Which are the most relevant climate adaptation related knowledge resources for your country?
- d) **Actor mapping:** Identify and describe the most relevant climate adaptation related actors for your country. Actors can be individuals and collectives (incl. organizations, agencies, working groups, networks), and include actors from public administration, politics, research and science, business and industry, and civil society. Mapping actors includes mapping their position (role, function, mandate, responsibility), resources, interests, and goals. To map out key actors and to follow Zimmermann and Maennling (2007) we distinguish:
 - a. legitimacy – position, rights, institutionalization;
 - b. resources – expertise, decision-making capabilities;
 - c. connections – quantity and quality of relationships with regard to their involvement in adaptation.
- > **Guiding question:** Who are the most relevant climate adaptation related actors in your country?
- e) **Interaction mapping:** Identify and describe the most relevant climate adaptation related interactions between policies (a), measures (b), knowledge (c), and actors (d). Interactions refer to processes and practices of adaptation and can be characterized as relations between policies (a), measures (b), knowledge (c), and actors (d). Types of interaction include:
Information transfer and exchange (e.g. regarding climate adaptation needs, priorities, or concrete adaptation action).
Decision making (incl. formal and informal decisions regarding adaptation).
Implementation (e.g. of adaptation concepts, strategies and action plans).
Reporting, Monitoring, and Evaluation (tracking and assessing adaptation progress).
Funding (e.g. of adaptation measures, strategy development, awareness raising events).

> **Guiding question:** Which are the most relevant climate adaptation related interactions between policies (a), measures (b), knowledge (c), and actors (d) in your country and with reference to the five types of interactions mentioned above?

Methods: Desk top research, Cross-checking by other (external) experts

6.2.2 Step 2: Visualizing

The visualization of climate adaptation governance for every country by developing illustrative (“maps”) has been commissioned as a sub-contract to the University of Applied Sciences FH Potsdam. Concepts of visualization and first drafts have been discussed at the partner meeting in Dessau, 3-24 November 2017. We followed an iterative design process by experimenting with various visualization types, finally resulting in the use of a radial network visualization. Overall, the visualizations were created using D3.js, a data-driven JavaScript library (Bostock, Ogievetsky & Heer, 2011). Each data node is arranged radially, ordered by category and their regional level. Relations between nodes are visualized by links connecting the nodes. Categories and regional levels are encoded by icons, link directions are visualized by small arrowheads and the types of relations by colour. The refined concept to visualize climate adaptation governance, a prototype, and first visualizations for Switzerland have been presented at the partner meeting in Ittigen/Bern, 17-18 May 2018.

6.2.3 Step 3: Compiling good practice examples

Identify and describe good practice examples of effective climate adaptation governance for your country.

Good practice in climate adaptation governance refers to its processes and structures. Following the policy cycle concept, good practice in climate adaptation governance supports the different stages of climate change adaptation policy-making: preparation, strategy development, action development, implementation, evaluation and policy revision. Good practice examples must have traceable connections to policies (a), measures (b), knowledge (c), actors (d) or interactions (e) between them. Good climate adaptation governance needs **interaction** (e) framed by a clear mandate, clear responsibilities, and horizontal and vertical coordination of **policies** (a), implemented through **measures** (b), pilot activities and other actions, based on evidence provided by tools, guidance, and **knowledge** (c), realised by a variety of **actors** (d) involved, engaged, and empowered. Accordingly, we distinguish 5 types of good practice examples:

- Good practice for interaction (information; decision making; implementation; reporting, monitoring and evaluation; funding)
- Good practice for policy
- Good practice for measure

- Good practice for knowledge
- Good practice for actor

Mandatory minimum requirements

- Identify 5 good practice examples per country; more examples are welcome.
- If possible identify 1 good practice example per type (= governance element)
- Outline the most import characteristics for each good practice example and explain why you consider your selection as a good practice example (about half a page, max. 1 page per good practice). Please use this scheme to provide good practice examples:

Name	
Region (country)	
Date (if possible)	
Description	
Explanation (why good practice)	
References (website, report)	

> **Guiding question:** Which are good practice examples of effective climate adaptation governance in your country?

Methods: Desk top research; workshops at partner meetings.

6.2.4 Step 4: Case Studies

Select one to three case studies of climate adaptation governance which you want to analyse in-depth. Case studies can be applied for good practice examples identified in WP1 step 3, but also for other concrete examples. Case studies may confirm or contradict assumptions about “good practices”. Working also on one “bad practice” example could provide important insight, too. Case studies are needed in particular to identify and analyse interactions. Case study analysis focuses on the most important barriers and success factors that hinder or support the planning and implementation of climate change adaptation in your case, and on how to overcome barriers and to further capitalize on these success factors.

Mandatory minimum requirements

- 1 case study per country
- 2-3 interviews (or a workshop involving 2-3 stakeholders or other formats) per case study
- Interviewees (or persons involved in other formats) represent ...

- If possible both, state actors (public administration, politics) and non-state actors (society, business, associations)
- different levels: state, sub-state (e.g. province, Bundesland, Canton, region), municipality
- Case study report (~10 pages) (= chapter 4 of WP1 Country Report, see step 6 for details)

> **Guiding questions:**

- (1) Which are the climate adaptation goals that are/were pursued in your case studies?
- (2) To which extent have these goals been achieved?
- (3) What are the most supportive factors for climate adaptation in your case studies?
- (4) What are the main barriers for climate adaptation in your case studies?
- (5) Which are the major lessons learned in your case studies?
- (6) What could have been done differently to make better progress and which enhancement options would interviewees propose to adapt to climate change in your case studies?

Methods: Go beyond desk top research; interviews or small workshops (e.g. focus group discussions) with key actors are mandatory for this step.

6.2.5 Step 5: Lessons learnt and enhancement options

This step is meant to interpret and assess the findings from step 1-4 and draw some conclusions. In accordance with the application form, these conclusions have to be elaborated as 'lessons learnt' and 'enhancement options'.

Identify lessons learnt and propose enhancement options (innovations, implementation pathways) based on findings in steps 1-4. Do not justify lessons learnt and enhancement options only with identified mapping items, good practices, or success factors. Please consider also the items not captured in the governance mapping, bad practices, as well as failures or gaps in terms of policies, measures, actors, knowledge, and interaction.

Lessons learnt and enhancement options could be derived from different sources, including findings from step 1-4, your own experience, literature research, your case study analysis.

> **Guiding questions:**

- Which are the major lessons learnt regarding climate adaption governance in your country and regarding the case study you analysed in-depth?
- What could be done to improve climate adaptation governance on national and subnational levels in your country?
- How to enhance the practice of climate adaptation governance in the case studies you analysed in-depth?

Methods: Desk top research; workshops at partner meetings; science-practice lab event (WP3, activity 3.4).

6.2.6 Step 6: WP1 Country report

Write a country report of max. 30 pages (plus annex, if needed) based on findings in steps 1-5.

Please use the following outline for your country report to facilitate a similar structure for all country reports, as well as comparison and synthesis accordingly.

1 Introduction [2 pages]

Background: GoApply project

Goals of the report

Structure of the report

2 Methods [2 pages]

How did you identify and analyse policy and other documents?

How did you select and analyse your case studies?

How did you identify and conduct interviews?

How did you identify good practice examples?

3 Mapping climate adaptation governance in [your country] [6 pages]

Policies

Measures

Knowledge

Actors

Visualization

4 Good practice examples of climate adaptation governance [your country] [4 pages]

Compilation of 5 (or more) good practice examples

5 Case Studies [10 pages]

Case Study 1 (incl. barriers and success factors, visualization)

Case Study 2 (incl. barriers and success factors, visualization)

6 Lessons learnt and enhancement options [4 pages]

Major lessons learnt

Major enhancement options

Assessment of governance mapping

7 Conclusions [2 pages]

[30 pages in total]

Steps 1-6 have to be done by every project partner. The following steps 7 and 8 have to be done by BAFU/WSL only.

6.2.7 Step 7: Transnational comparison and recommendation

BAFU/WSL compare the compiled information from steps 1-6 by:

- a) setting up inventories (portfolios) for policies, knowledge, good practices, and actors in the Alpine space,
- b) highlighting common features and differences between countries and
- c) develop recommendations to enhance climate adaptation governance.

Method: Desk top research (BAFU/WSL); workshops at partner meetings and review loops (all PPs)

6.2.8 Step 8: WP1 report

BAFU/WSL prepare a WP1 report covering steps 1-7.