

## THE GOVERNANCE OF CLIMATE CHANGE ADAPTATION IN TEN OECD COUNTRIES: CHALLENGES AND INSTITUTIONAL ARRANGEMENTS

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#### ***Abstract (ca 250 words)***

Adaptation to climate change has become an integral part of climate change policies across the world. Based on the limited literature on the governance of climate change adaptation, the paper first highlights four key challenges governments face in this context, i.e. (i) how to better integrate adaptation policies horizontally across policy sectors and (ii) vertically across levels of government, (iii) how to integrate knowledge in adaptation policy decisions, and (iv) how to involve stakeholders in adaptation decisions. The paper then shows how selected OECD countries address these challenges when developing and implementing adaptation policies and instruments. We identify the most important governance mechanisms on the national level which constitute a distinct governance structure in each surveyed country, and highlight their objectives and specific foci on one or more governance challenges. The paper analyses dominant modes of emerging interaction patterns in the respective governance arrangements.

Keywords: adaptation to climate change, adaptation governance, adaptation policies, horizontal integration, vertical integration, uncertainties, participation.

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## 1. ADAPTATION TO CLIMATE CHANGE AND ITS GOVERNANCE

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After two decades of climate change mitigation policies that failed to curb global greenhouse gas emissions and often catastrophic signs of already changed climate patterns in many regions of the world (IPCC 2007), adapting to these and future changes became an increasingly important policy issue in Europe and around the world. According to the IPCC, adaptation to climate change can be defined as “adjustment in natural or human systems in response to actual or expected climatic changes or their effects, which moderates harm or exploits beneficial opportunities” (IPCC 2001, 2007). This paper focuses on how governments in OECD countries develop policies that aim to facilitate the adaptation to climate change across different sectors, levels and actors.

Adaptation is the rule rather than the exception of human development. Throughout the history of humankind, individuals, organisations and entire societies (tried to) adapted to observed or experienced changes in the natural environment, not always successfully. Consequently, the adaptation of societies to new climatic circumstances has a long history. Nevertheless, adaptation to unprecedented climate change poses new challenges and can take on many forms:

- It can be concerned with individual habits, business practices, private property and public infrastructure, institutions, governance practices and public policies (hence adaptation policies facilitating the adaptation others are themselves a sign of adaptation);
- So far, adaptation was usually a response to observed changes; current adaptation policies are also concerned with proactively anticipating changes that are expected in the future;
- It can be costly (e.g. when new dams are built) or it can be a cost saving “no-regret” option (e.g. when better building codes result in less heating/cooling), no matter what effects climate change will have, and,
- It can take place autonomously or politically driven.

Although many examples may illustrate that autonomous adaptation can be very effective and that politically driven adaptation can fail, the unprecedented pace of current changes in the world’s climate and the increasing complexity of societies both suggest that governments have to play a more active role. As Berkhout (2005) and others note, autonomous, self-regulated societal adaptation fails in particular when those affected by climate change

- Are not aware of the need to adapt (e.g. because future impacts are hard to foresee);
- Are aware of the need to adapt but do not have the necessary capacities (e.g. financial resources, knowledge on what to do and how to do it, technical expertise);
- Have conflicting interests and are therefore unable to find a consensus on common action (e.g. ski resorts who have to invest in snow making machines and hotels that benefit from winter tourism but refuse to contribute to the investment);
- Are not the ones that can adapt because they suffer either from external effects that are triggered or reinforced by climate change (e.g. farmers or fishermen downstream of a dam that dries out the river under a drier climate), or from an

inadequate public infrastructure (e.g. too weak dams that protect land from flooding).

Thus, public policies on the adaptation to climate change are (or ought to be) concerned with, *inter alia*, raising awareness for the issue, building adequate capacities and helping to put capacities into action (Nelson, Adger, and Brown 2007; Adger, Arnell, and Tompkins 2005), resolving conflicts of interest, reducing external effects that are triggered or reinforced by climate change, and ensuring that public infrastructure (roads, bridges, flood protection and sewage systems, etc.) withstands future climate impacts. The policy instruments that are available for changing behaviour and steering society include regulatory/legal instruments, fiscal/economic instruments (such as taxes, tax breaks, subsidies), informational and persuasive instruments (such as studies, brochures, campaigns, appeals), partnering instruments (such as negotiated agreements, voluntary agreements and public-private partnerships), and hybrid instruments that combine several of the other instruments (such as adaptation programmes). In other words, the toolbox of adaptation policy making offers several instruments, and making use of them alongside mitigation efforts became common government practice around the world in recent years (Adger 2003; Kahn 2003; Klein and Smith 2003; Adger et al. 2007; Biesbroek et al. 2010).

So far, research on climate change adaptation, has focused mainly on climate scenarios, observed and expected impacts, and on respective ecological, societal and economic vulnerabilities. Only little systematic research has been done on actual adaptation policies, and even less on *how* these policies are (or ought to be) developed and implemented. With a few recent exceptions (Biesbroek et al. 2010) the governance of climate change adaptation analysed here is still a blind spot in social science research (IPCC 2007, 19f; Schipper and Burton 2009). This can be explained by the simple fact that “[t]he governance framework of adaptation is still largely in the making” (Paavola 2008, 652). The present paper addresses this scholarly gap in two steps. In the following section it explores what governance challenges governments face when they aim to facilitate the adaptation to climate change. Based on a survey, section 3 shows how 10 OECD countries address these challenges in order to develop effective adaptation policies. By doing so our research goes well beyond national adaptation strategies, one of the few governance arrangements that has been researched so far (Biesbroek et al. 2010). Section 4 compares and discusses governance patterns across countries and explores whether a ‘standard set of governance arrangements’ can be identified.

Why is the governance research summarised here important? By focusing on interesting practices of ‘how to do it’, the paper analyses ways and means that help to develop and implement adaptation policies that are concerned with the ‘what to do’. Because respective governance arrangements and tools are relatively new, governments can learn a lot from practices in other countries. Not paying attention to the challenge of how to deliver adaptation policies through adequate governance arrangements would inevitably hamper effective adaptation driven by public policies. In this sense, “institutional requirements for adaptation” are also acknowledged as important in facilitating adaptation to climate change in the latest IPCC report from 2007 (Adger et al. 2007, 731; Klein et al. 2007).

## 2. GOVERNANCE CHALLENGES AND RELATED CONCEPTS

The literature and policy documents on adaptation suggest that governments face at least four complex governance challenges when developing adaptation policies (for an overview, see table 1): They have to cope with current and future climate change effects that (i) cut horizontally across different policy sectors and (ii) vertically across different levels of government, (iii) largely base on prognostic statement and are therefore accompanied by several uncertainties, and (iv) affect and concern a broad range of non-state actors that often lack awareness and capabilities.

**Table 1: The governance of climate change adaptation: problem structure and challenges**

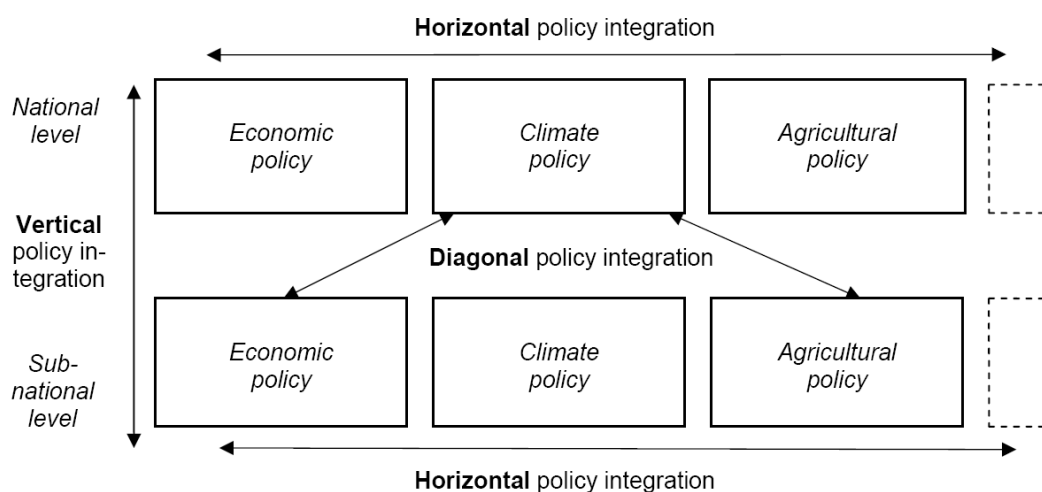
<b><i>Problem structure</i></b>	<b><i>Governance challenges</i></b>
Climate change impacts and adaptation efforts cut across policy sectors	Better integrate adaptation policies horizontally (across policy sectors)
Climate change impacts and adaptation efforts cut across levels of government	Better integrate adaptation policies vertically (across levels of government)
Knowledge needs and uncertainties persist regarding (a) climate scenarios, (b) regional impacts and vulnerabilities, (c) adaptation needs, options and priorities, (d) the effectiveness of actual policies	Improve the knowledge-base of adaptation policies and cope with uncertainties
Adapting to climate change is often in the responsibility of non-state actors who often lack respective awareness and capacities	Involve non-state actors (often referred to as 'stakeholders') in governance and knowledge brokerage processes

The first major challenge addressed here is that climate change effects and adaptation pressures cut horizontally across the ministerial (or departmental) organisation of governments. The policy fields highly relevant in the context of climate change adaptation are those concerned with, e.g., housing, landscape planning, public health, public infrastructure, agriculture, forestry, tourism, water and coastal management (European Commission 2007; Burton, Diringer, and Smith 2006, 6ff, 12; FAO 2007; Yohe et al. 2007; OECD 2008). To make complexity worse, most of these policy fields are also relevant for climate change mitigation (Klein et al. 2007) and sustainable development policies (Yohe et al. 2007). Thus, governments are called upon to better integrate adaptation policies within and beyond the environmental domain. The governance literature on this challenge is rich, in particular in the environmental policy field. According to (Lafferty 2002, 13), environmental policy integration (EPI) requires the integration of environmental policy objectives "in all stages of policy making in non-environmental policy sectors" (see also Nilsson and Persson 2003; European Environment Agency 2005; Lenschow 2002; Volkery 2006; Jordan and Lenschow 2008). While the environmental and sustainable development policy and governance literature cited above refers to this challenge as 'policy integration', the adaptation experts (including the authors of the IPCC reports) refer to it also as 'climate mainstreaming' (Klein et al. 2007, 768). As the European Commission (2007, 13) puts it in its Green Paper (oversimplified), "Adaptation is largely a question of political coherence, forward planning and consistent and coordinated action". Traditional modes of steering or coordination are hierarchies,

markets and networks. While hierarchical governance relies mainly on command and control, network governance relies mainly on collaboration among actors with common interests and/or complementary resources, and the market mode of governance relies on financial incentives (Thompson et al. 1991; Gamble 2000; European Commission 2001; Considine and Lewis 2003; Kooiman 2003; Donahue 2004).

The second challenge addressed in our research is that adaptation pressures and responses also cut across different levels of government, from the EU via the national to the provincial and local levels of policy making (European Commission 2007, 11f; Klein et al. 2007, 747). As Adger et al. (2005) emphasise, “the dynamic nature of linkages between levels of governance is not well-understood, and the politics of the construction of scale are often ignored”. Since policy-making at these different levels is not always joined-up and coordinated well, the climate change literature speaks of ‘cross-scale interdependencies’ that are not matched with adequate ‘cross-scale linkages’ (Adger, Arnell, and Tompkins 2005, 79f). If adaptation issues are integrated across different levels of government within the same policy field (e.g. environmental hazard management) we speak of vertical policy integration. If adaptation policies are integrated horizontally across sectors and vertically across levels of government at the same time one can speak of diagonal policy integration (see figure 1).

*Figure 1: Horizontal, vertical and diagonal policy integration*



According to the EU’s Green Paper on adaptation, “Multi-level governance is [...] emerging” to achieve a better vertical coordination and integration of policy making across levels of government (European Commission 2007, 11). As the multi-level governance literature suggests, coordination may be achieved by four basic ideal-type mechanisms or combinations thereof, i.e. by hierarchy, mutual adaptation (e.g. by means of exchanging information, policy ideas and arguments that entail policy learning), competition, and/or negotiations (Benz 2004; Scharpf 2000; Schimank 2007). Although the concept of multi-level governance was pioneered in EU studies (Marks 1993) it can be fruitfully applied to any multi-level policy system and policy field.

Third, climate change adaptation poses specific governance challenges regarding the integration of various (and possibly competing) knowledge claims in decision-making as well as the dealing with high degrees of uncertainty. Although first impacts of climate

change can be witnessed already, the majority of impacts and related damages are expected to occur in the future. Therefore science with its predictive capacity plays an important role in the governance of adaptation, in particular concerning (a) climate scenarios in general, (b) the variations of regional impacts and vulnerabilities in particular, (c) resulting adaptation needs, options and priorities, and, (d) the effectiveness of actual adaptation policies (Ford 2008; Tol 2005; Barnett 2001). Further, intrinsic to the anticipatory nature of most of the knowledge on climate change are high degrees of uncertainties. Consequently, there is a high demand for so called useable knowledge, i.e. knowledge that is salient and can be easily applied to decision-making contexts. This in turn implies the institutionalization of knowledge brokerage (or science-policy-society interactions) that not only foster and facilitate the production of knowledge (i.e. research) but that equally deal with aspects of managing, sharing, distributing and applying knowledge and research results. Depending on what counts as expertise or who counts as an expert, how the boundary between science, society and politics is understood and how knowledge and value claims are negotiated, knowledge brokerage arrangements can be broadly differentiated into a linear model (further differentiated in the technocratic and decisionist model) or an interactive model (pragmatic and co-productive model) of science-policy (-society) interactions (Jasanoff 2004, 6; Schützeichel 2008, 18f; Kevenhörster 2003).

The fourth challenge for adaptation governance concerns the involvement of non-state stakeholders (such as NGOs, agricultural associations, tourist associations, etc.) and the broader public in knowledge brokerage (see above) and the formulation of adaptation policies. Non-state stakeholders often have valuable knowledge on and experience with the particularities of local or sectoral circumstances, impacts and adaptation options. In addition they are crucial actors in the implementation of adaptation policies and measures. Regarding the latter, the scholarly literature recognises participation (or stakeholder involvement) as an important governance response that addresses both normative concepts such as 'procedural justice' (Nelson, Adger, and Brown 2007, 409ff; Paavola 2008, 650)<sup>1</sup> or good governance (Steurer, Berger, and Hametner 2010) as well as instrumental considerations. Instrumental considerations stress that effective participation can also improve and/or legitimise policy decisions, create ownership and commitment (Yohe et al. 2007, 832; OECD 2008, 66f; Fiorino 1990) and therewith facilitate its implementation. Participation can assume an informative, consultative or decisional character (Green and Hunton-Clarke 2003). The three modes of participation differ concerning the possibilities of stakeholders to contribute their knowledge, views and experiences to the policy making process and their decisional power. While informative participation is concerned with informing stakeholders, consultative participation means that stakeholders contribute their expertise to the policy making process, and decisional participation means that policy makers and stakeholders take common decisions (e.g. in a council or working group drafting an adaptation strategy). In the survey we included only governance approaches that go beyond informational participation.

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<sup>1</sup> The related challenge of 'distributive justice' asks whether those affected most by climate change are also the ones who benefit the most from adaptation policies. Since the proposed research focuses on procedural governance issues rather than on policy outcomes this challenge is omitted here.

### 3. TAKING STOCK OF GOVERNANCE APPROACHES IN 10 OECD COUNTRIES

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Since little is known about the governance of climate change adaptation, this section provides the first comprehensive account of how selected governments address adaptation to climate change across sectors and territorial scales, how they try to cope with uncertainties, and how they aim to involve stakeholders in policy making. The diversity of governance approaches described here can be divided into two basic categories: *governance arrangements* (such as interdepartmental committees or adaptation councils) are usually sophisticated and resource intensive mechanisms, institutions (in the sense of organisations and structures), or policy making procedures. To be effective they require high-level political commitment. *Governance tools* (such as guidelines and checklists), on the other hand, are smaller-scale, less politicized and usually not institutionalized instruments that help public administrators to cope with a particular governance challenge when developing adaptation policies. They are rather simple, ready-to-use *tools* that rely not so much on political commitment than on acceptance by those who (are supposed to) use them. Due to the abundance of tools the present paper focuses on governance arrangements only.

Neither governance arrangements nor tools are ends in themselves. They are means that help to develop and implement policy instruments which, in turn, aim to achieve policy objectives by steering society or by adjusting public infrastructure. While governance arrangements and tools are generally geared towards public institutions and actors such as ministries at different administrative levels, public agencies and communities, adaptation policies usually aim to change the behaviour of non-state actors. The exceptions to this rule are policies concerned with the provision of public infrastructure. While most governance arrangements and tools described here are easy to distinguish from policies and policy instruments, there is a grey area in which the distinction is sometimes difficult. The following two examples illustrate this grey area:

- In some instances, policies and governance approaches are closely related or even intertwined. National adaptation strategies, for example, represent a policy (as far as they formulate policy objectives and measures) and governance approaches (as far as they foresee inter-ministerial coordination, implementation, participation, and/or monitoring mechanisms).
- Checklist or guidelines are governance tools if they aim to help state actors in formulating and implementing adaptation policies (also with regard to the adjustment of public infrastructure). They are (informational) policy instruments if they aim to change the behaviour of non-state actors.

Before we fill these conceptual remarks with empirical substance, the survey methodology is briefly outlined below.

#### 3.1. SURVEY METHODOLOGY

Since the survey intended to take stock of a preferably broad variety of innovative and politically salient governance approaches in developed countries, we selected 10 OECD

countries that have been identified as rather active and advanced in adaptation policies.<sup>2</sup> The selection was based on the adaptation literature, advice from a panel of experts,<sup>3</sup> and a preliminary screening of 19 potentially relevant countries.<sup>4</sup> Based on concepts and categories described in an analytical framework (Steurer, Bauer, and Feichtinger 2010), the stock taking started with a desk research of academic literature, policy documents, government reports (e.g. those submitted under the UNFCCC), and websites on the selected countries. In this phase, well documented governance approaches were identified and their basic characteristics described. In a second step, 17 semi-structured telephone interviews were conducted with public administrators and other experts between July and September 2010 (for the interview guide, see Steurer, Bauer, and Feichtinger 2010). The survey interviews added missing information on already identified governance approaches as well as new approaches that were not identified in the desk research phase. After introducing the governance frameworks for adaptation in general terms this section highlights the most significant findings of the stock taking survey, organised alongside the four governance challenges described in section 2 above.

### 3.2 THE EMERGENCE OF ADAPTATION GOVERNANCE

Adaptation to climate change is a rather young policy field. The United Kingdom Climate Impact Programme, established in 1997, marks one of the earliest attempts to systematically address this new challenge. In 2003 Finland was the first country to develop a National Adaptation Strategy which was adopted in 2005. Meanwhile, all of the surveyed countries have developed a National Adaptation Strategy (sometimes also referred to as National Adaptation Plan or National Adaptation Framework), or are in the process of formulating one (Austria). In the course of the elaboration and implementation of adaptation strategies and respective policies the surveyed countries have developed a range of institutional arrangements to tackle the presented challenges. Before analysing these governance arrangements in the following sections we first take a look at the organisation of the political responsibilities and the legal frameworks for climate change adaptation.

The assignment and distribution of responsibilities for climate change adaptation governance varies across the surveyed countries. Australia and Denmark established a Government Department or Ministry for Climate Change which deals with both mitigation and adaptation policies. In most of the other countries (i.e. Austria, Germany, Norway, and Spain) the responsibilities for both climate change adaptation and mitigation are assigned to the ministries in charge of environmental policies, in Austria and Spain also to the same section. In Finland and the UK the responsibilities for climate change mitigation and adaptation policies are dispersed across different ministries or departments. In Finland the Ministry of Forestry and Agriculture is responsible for adaptation policies while the Ministry of Environment is responsible for mitigation policies. In the UK the Department for Environment, Food and Rural Affairs (Defra) is concerned with England's adaptation policies as well as mitigation policies within the frame of its competencies (i.e. food, environmental management, agriculture) while the

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<sup>2</sup> The countries include Australia, Austria, Canada, Denmark, Finland, Germany, Norway, Spain, the Netherlands, the United Kingdom. Austria was selected because a key purpose of the project is to provide policy advice on the governance of adaptation in Austria.

<sup>3</sup> See <http://www.wiso.boku.ac.at/16381.html>.

<sup>4</sup> The countries screened and finally excluded were Czech Republic, France, Hungary, Italy, Japan, Korea, Portugal, Sweden, United States of America.



Department of Energy and Climate Change (DEEC) deals with mitigation policies in general. Similarly, in Canada the most active Department in climate change adaptation is Natural Resources Canada, while Environment Canada shows a higher level of activity in climate change mitigation and some activities in adaptation. In Norway responsibilities for climate adaptation are divided between different Ministries. While the adaptation process is led by the Ministry of the Environment, the practical coordination work has been placed with a secretariat at the Norwegian Directorate for Civil Protection and Emergency Planning (DSB) which is subordinated to the Ministry of Justice and the Police.

In the Netherlands responsibilities for adaptation governance shifted from its inception. The adaptation to Climate Change was first led by the Ministry of Housing, Spatial Planning and the Environment in close cooperation with three other Ministries. The elaborated adaptation strategy, "*make room for climate*" (2007) has a focus on spatial planning. However, the announced operationalization of the strategy, the national adaptation agenda, was never realised; instead the strategy was (partly) incorporated into the so called Delta Programme, a programme focusing on water management and adaptation to water regime changes through climate change. Three ministries are still cooperating closely, but the main responsibility (and focus) shifted to the Ministry of Transport, Public Works and Water Management.

Often, ministries are supported by separate institutions that take over several operative responsibilities such as organising meetings, supporting adaptation policies on a functional-technical level. Examples for these support units are KomPass in Germany, the Federal Environment Agency in Austria, the Energy Agency in Denmark and the Directorate for Civil Protection and Emergency Planning (DSB) in Norway.

While in most countries adaptation policies rely on the rather soft, i.e. non-binding and recommending strategy documents (such as a National Adaptation Strategy), the UK has set a legally binding framework for its adaptation governance. The UK Climate Change Act 2008 sets out the responsibilities of the government in relation to the adaptation to climate change: it mandated the creation of an Adaptation Sub-Committee of the independent Committee on Climate Change, and it foresees that a Climate Change Risk Assessment and a National Adaptation Programme have to be renewed every five years (Department of Energy and Climate Change 2009, 87). Furthermore, the Act enables the Government to require reporting on adaptation activities by public authorities and statutory undertakers (Department of Energy and Climate Change 2009, 87). In other words, the Act established several governance arrangements on a statutory basis that address the challenges of knowledge integration, horizontal and vertical integration. Similarly, in Norway risk and vulnerability analysis for municipalities are decreed by law in order to ensure that municipalities involve climate change adaptation into their work.

The Netherlands are also on the way to reach a mandatory status for their adaptation activities. However, their adaptation programme focuses mainly on water management. To implement the so called Delta Programme the Netherlands established a Delta Committee headed by a Delta Commissioner who acts as a government commissioner, under the direct responsibility of the coordinating cabinet minister, the Minister of Transport, Public Works and Water Management. The political positioning of the Delta Programme reflects its importance. A Delta Act was submitted to the Lower House in February 2010 but has not been adopted yet. The Delta Act is going to constitute the legal basis for the Delta Fund which can be used to finance the Delta Works of the future.

The following section analyse the different frameworks for adaptation governance across the surveyed countries. They show what governance arrangements governments have in place to facilitate horizontal integration (3.3), vertical integration (3.4), knowledge integration (3.5), and stakeholder integration (3.6).

### 3.3 HORIZONTAL INTEGRATION

Horizontal integration, i.e. the coordination and integration of adaptation policies across sectors is of particular importance during the development of the overall adaptation framework (e.g. in form of a national adaptation strategy/NAS), and therefore governments tackle it with a broad variety of governance arrangements. However, in many cases horizontal coordination is largely limited to this early phase of policy formulation. Consequently, the development of concrete adaptation policies and measures as well as their implementation is still largely a sectoral issue in many countries.

#### *Governance arrangements for horizontal integration*

The process of the development of a National Adaptation Strategy or Plan (or similar strategic policy documents) in many countries marks the first and often most important form of horizontal coordination between different ministries or departments. The coordination may be organized in form of a *series of workshop meetings* to which representatives of all ministries or departments are invited (e.g. in Austria the 'informal workshops' and the 'participation process', in Finland the seminars) or in form of a *temporary inter-ministerial working group* with the task to develop and draft the NAS or similar policy documents. In Canada for example, the Intergovernmental Climate Change Impact and Adaptation Working Group was set up for the drafting of the National Climate Change Adaptation Framework and dissolved after the work was finished. Also in the Netherlands the ARK steering committee and the ARK programme team were dissolved after the national adaptation strategy was completed. Inter-ministerial working groups may aim at stimulating adaptation activities, at informing each other on activities, and at ensuring a consistent conceptual approach by the national government. The inter-ministerial working groups discuss sectoral ideas and possible contributions; the initiatives of the various federal ministries are brought together.

Once approved National Adaptation Strategies (or similar documents) become important governance mechanisms for the horizontal coordination of adaptation policies. The NASs set out overall goals, priorities and areas for action in adaptation policies and thus serve as central guidance to various ministries (and often also different administrative levels) in the area of adaptation. However, the effects on horizontal coordination and integration are often limited by the strong sectoral approach many NASs follow (see below).

Several countries have established permanent coordination bodies that deal with coordination and integration during the formulation as well as implementation of national adaptation policies. Examples for such permanent institutionalised coordination bodies are the Danish Coordination Forum for Climate Change which includes representatives from nine ministries, regions and local governments; the German inter-ministerial working group, where all national departments are represented through one or two officials or the Finish Coordination Group for Adaptation to Climate Change. These arrangements aim to ensure a common basis, to find synergies and inform about different possible adaptation actions.

In addition existing coordination bodies that previously were responsible for coordinating mitigation policies are broadened to adaptation issues. Examples include the Austrian Kyoto Forum and Inter-ministerial committee on climate change (IMK), the Spanish Working Group on Impacts and Adaptation and the Spanish Coordination commission of climate change policies (CCPCC).

Besides these rather comprehensive coordination mechanisms aiming at including all departments/ministries there also exist arrangements with a narrower scope and focus. For example, in the Finish Ministry of Environment the network on adaptation to climate change was established in order to coordinate the formulation and implementation of adaptation policies within the environmental administration.

Formal consultation processes on adaptation policies are another form of horizontal coordination. Within these processes draft policy documents are sent to concerned ministries or departments with the possibility of handing in statements. Such consultation processes belong to the standard approaches in many policy areas. Consultation processes are for example foreseen in the process of the formulation of the Austrian NAS.

**Table 2: dominant governance arrangements dealing with horizontal integration – an overview**

Country	Temporary coordination body (working group; workshop series during the development of the NAS)	NAS or similar strategic document or Statutory framework	Permanent coordination body & (new or pre-existing)	Consultation process
<b>AU</b>		National Climate Change Adaptation Framework (2007-2012/14)	Australian Government Department of Climate Change and Energy Efficiency	
<b>AT</b>	Series of 'informal workshops' 'participation process'	To be adopted in 2011	<ul style="list-style-type: none"> <li>Austrian Kyoto Forum</li> <li>Inter-ministerial committee on climate change (IMK)</li> </ul>	2 consultation rounds in the process of the formulation of the Austrian NAS
<b>CA</b>	Intergovernmental Climate Change Impact and Adaptation Working Group	National Adaptation Framework	[--]	
<b>ES</b>		National Adaptation Plan, including Working Programme I and II	Working Group on Impacts and Adaptation Spanish Coordination commission of climate change policies (CCPCC)	
<b>DE</b>		German Strategy for Adaptation to Climate Change (2008) Action Plan on Adaptation (expected 2011)	Inter-ministerial working group (IWG adaptation)	
<b>DK</b>		Danish Strategy for adaptation to a changing climate (NAS)	Coordination Forum for Climate Change Adaptation	
<b>FI</b>	Series of seminars during the development of the NAS	National Adaptation Strategy (2005)	Finish Coordination Group for Adaptation to Climate Change	
<b>NL</b>	ARK steering committee and the ARK programme team	National adaptation strategy 'Make room for Climate' (2007)		
<b>NO</b>	.	Klimatilpasning I Norge (2008)		
<b>UK</b>	Cross-government working group on revising the Green Book guidance	Climate Change Act 2008 Adapting to Climate Change: A framework for Action (2008)	Adapting to Climate Change" (ACC) Programme	

*Please note: The table so far does not present a complete picture of the governance arrangements in the respective countries but gives examples for governance arrangements in the countries. A blank field does not indicate that no such governance arrangements exist, rather no arrangement is indicated by [--].*

#### *Patterns, modes and degree of horizontal integration*

Although horizontal coordination is fostered by various governance arrangements, the realized degree of coordination in most countries is rather small. Adaptation policies are mostly sectoral organised with little systematic dealing with its interdependencies. Even though the national adaptation actions are discussed in inter-ministerial groups the decision-making to engage for a certain adaptation measure happens within the respective resort, as does the implementation. In the phase of developing national strategies ideas from different resorts were contributed voluntarily as addition and as enrichment of the national agenda and do not conflict with each other. In several cases the discussion and drafting of the NAS took place in separate working groups that were defined along sectoral boundaries. A closer look at the various National Adaptation Strategies also reveals the dominance of a strong sectoral approach. In many strategies vulnerabilities, adaptation needs and possible measures are listed for each sector separately with few considerations of synergies and conflicts. The strategies thus reflect the influence and contributions of different Ministries or sectors very well. In most countries the broad participation of all ministries or departments is sought (though not always realized) in order to mainstream adaptation in all policy areas. Consequently, most strategies show a broad range of adaptation areas. The Dutch strategy is somehow an exception as only four ministries were involved. The overall strong sectoral focus on water management and physical planning reflects severe pressures in the Netherlands. In the remaining strategies ideas from different sectors are collected and listed. The national coordination may have the advantage of bringing incentives to resorts that otherwise would never have considered certain adaptation policies as relevant for their responsibilities.

In some countries horizontal integration is largely restricted to the phase of the formulation of the strategy document. In Canada an inter-governmental working group guaranteed some degree of horizontal coordination during the development of the National Adaptation Framework, however this coordination was not continued after the approval of the Framework. In addition the framework is of rather low importance in the overall adaptation governance. Overall, Canada shows rather few attempts and consequently arrangements to coordinate different departments at the national level. The sectoral adaptation processes are pursued independently. The respective Departments (most importantly Natural Resources Canada, Environment Canada, Indian and Northern Affairs Canada and Health Canada) pursue their own adaptation policies on the basis of programme funding by the government and interact only on a sporadic and ad hoc basis. Interviewees stated that they do not perceive coordination with other policy areas as an important issue.

A similar situation can be found in Australia. Australia developed a national strategy, the National Climate Change Adaptation Framework (2007-2012/14) by a working group of officials from all levels and the Framework was considered by the Prime Minister and first Ministers and endorsed as an agreed collaborative action between the Australian Government and the State Governments. Similarly to Canada the Australian interviewees emphasise that the framework is not comprehensive and that adaptation actions embedded into a variety of policy initiatives and reform processes underway are of high importance. These independent actions are not part of the framework. Examples are a water reform process ('Water for Future') which includes a substantial adaptation part.

The water reform process is supposed to set mechanisms in place that help Australia's needs to adapt to a future with less water. The management of the Great Barrier Reef, jointly set up by the Australian Government and the State of Queensland, also contains an embedded focus on climate adaptation. And there exist embedded adaptation actions in the primary industry sector, the process lead to a National Agriculture and Climate Change Action Plan.

When it comes to the integration of climate change adaptation and mitigation policies; the survey showed that those two pillars of climate change policies are hardly integrated on the national level, neither in strategies nor within the coordination bodies. Even though the close relationship between mitigation and adaptation is acknowledged, in the sense that successful mitigation reduces necessary adaptation measures, the majority of the interviewees do not see the integration of mitigation and adaptation on the national level as necessary. Some actors say it is important to know the activities in both areas in order to identify potential synergies. But responsible actors also argue that mitigation and adaptation follow two distinct conceptual logics: While mitigation is more of a technical top-down process with standards set and monitored by the authorities, adaptation is more of an open process, including a wide range of areas of activities. Adaptation processes are at the very beginning of their development, where it is still unclear who is affected by climate change and to what extent. Adaptation to climate change does not have a long history or well-defined areas of responsibilities which opens up for new ways of cooperating. The process of climate adaptation is perceived as being more open, integrating and bottom-up.

Climate adaptation is a new, complex and therefore more open governance process. These characteristics probably add to the dominant mode of horizontal coordination and integration in the surveyed countries, which can be described as the network mode (Scharpf 1993, 72). Interaction and coordination of ministries or departments; be it in workshops or in inter-ministerial working groups, takes place on a voluntary basis and allows for deliberation among equals. Though there is a responsible section or ministry generally the processes are not driven top-down or in hierarchy but rather through coordination and exchange between simultaneously operating arenas of negotiation. Their mandate is to consider all options of activity and therefor follows the mode of positive coordination (Scharpf 1993, 69).

Patterns of coordination within the consultation processes, however, show characteristics of the hierarchical mode as there is no possibility for interactions and deliberations and the responsible administration has the control over the processing and the consideration of the statements. This dialogue is asymmetric as the responsible actors hold the power to decide what statements to include or to ignore in the further adaptation process.

### 3.4 VERTICAL INTEGRATION

Vertical integration, i.e. the coordination and integration across different administrative levels, from the national, to the regional, to the local, plays an important role in the formulation of adaptation policies and even more in the implementation of the policies. Many adaptation activities lie within the responsibilities of provinces or municipalities (e.g. land utilization planning or environment protection) and thus make sub-national levels crucial actors for the successful implementation of adaptation policies. Because of this interviewed actors on national level acknowledge the importance of regional and municipal bodies. In addition, in federally organized countries, the sub-national level

often holds legislative power concerning adaptation policies (e.g. water management in Germany).

#### *Governance arrangements for vertical integration*

Regarding the setting of the overall adaptation framework, i.e. the formulation and implementation of a National Adaptation Strategy and similar documents, in many countries the same governance arrangements that address horizontal integration (i.e. workshop series, temporary and permanent coordination bodies, formal consultation processes) also address vertical integration though to different degrees. In Finland, for example, the Association of Finnish Local and Regional Authorities is represented in the working group in order to represent the views of the local and regional level alongside representatives of different ministries. The same situation exists in Denmark where associations of the Local Government Denmark and the Danish Regions are represented within the cross-ministerial Coordination Forum for Climate Change Adaptation. In contrast to these examples where associations of the local and regional level are involved, in the Austrian 'participation process' (i.e. a workshop series) in the frame of the development of the NAS representatives of each province are invited to participate.

The surveyed federal states often establish a specific committee or working group for vertical integration of climate adaptation matters within existing federal coordination structures. The Australian COAG Working Group on Climate Change and Water is such a vertical coordination body. COAG stands for Council of Australian Governments, the council comprises the Prime Minister of Australia, the First Ministers of each state and territory and a representative of the Australian Local Government Association. It is the prime forum for inter-governmental collaboration within the Australian federal system of government on issues of national importance. In Germany, the permanent vertical coordination body, standing commission on adaptation to Climate Change, was established within the existing Federal-Länder Dialogue and the conference of the environment ministers (*Umweltministerkonferenz*). While the importance of vertical integration differs across countries in the formulation of adaptation strategies and policies (e.g. there is was no vertical coordination in the formulation of the Canadian National Adaptation Framework), the challenge of vertical integration is intensively addressed in the further development and implementation of adaptation policies in all countries. Important governance arrangements for fostering vertical integration include network programmes, guidance tools and statutory reporting.

Network programmes are programmes that fund and facilitate the set-up of regional or local networks, often including local or regional administrative actors, stakeholders as well as experts. Prominent examples include the Regional Adaptation Collaboratives (RACs) in Canada and the UKCIP's Local and Regional Adaptation Partnership (LRAP). Currently 6 RACs are supported by the Canadian Climate Change Impact Division (CCIAD) with the aim to advance adaptation planning and decision-making at the regional level. Similar, but on a smaller scale, is the Norwegian 'Cities of the Future' initiative supporting the 13 largest cities in Norway to both reduce greenhouse gas emissions and adapt to climate change.

Most progressed in providing guidance and tools for the regional and local level is the UK. Especially the UKCIP has developed a range of tools, for example the local climate impacts profile, a case study database or support in relation to the National Indicator 188 (NI188). The NI 188 is a further governance arrangement for vertical integration. Under

the UK Climate Change Act 2008 the government has the power to require public authorities (including regional and local authorities) and statutory undertakers to report on how they have assessed the risks of climate change to their work, and what they are doing to address these risks. For the purpose of this reporting the National Indicator 188 was introduced for the local level. With this statutory reporting and the NI188 the UK has abiding governance arrangement for vertical integration. Similarly, in Norway risk and vulnerability analysis for municipalities are decreed by law in order to ensure that municipalities involve climate change adaptation into their work.

Other countries provide support and guidance primarily on a voluntary basis, the guidelines and tools are still developed or tested or are close to being launched. Germany for instance is going to launch a tool ('Klimalotse') at the end of October 2010, which supports municipalities and companies to gain knowledge about vulnerabilities and shows possible adaptation measures. Denmark is also testing support tools for municipalities in climate adaptation matters which provide regional or local climate models and possible adaptation. Norway offers guidance material from different Norwegian Directorates and is in the process of launching a web based guide for municipalities and regional level. In developing that web based guidance tool a broad consultation has taken place.

**Table 3: dominant governance arrangements dealing with vertical integration – an overview**

Country	Temporary coordination body (working group; workshop series during the development of the NAS)	NAS or similar strategic document, guidance document	Permanent coordination body & (new or pre-existing)	Consultation process with state actors	Network programme	Statutory reporting and guidance tool
<b>AU</b>		National Climate Change Adaptation Framework (2007-2012/14)	COAG Working Group on Climate Change and Water		Local Adaptation Pathways Program	
<b>AT</b>	Series of 'informal workshops' 'participation process'	To be adopted in 2011	Austrian Kyoto Forum and Inter-ministerial committee on climate change (IMK)	2 consultation rounds in process of the formulation of the Austrian NAS		
<b>CA</b>		National Adaptation Framework	[--]		Regional Adaptation Collaboratives (RACs)	Guidelines for municipalities
<b>ES</b>		National Adaptation Plan, including Working Programme I and II	Working Group on Impacts and Adaptation Spanish Coordination commission of climate change policies (CCPCC) National climate Council			
<b>DE</b>		<ul style="list-style-type: none"> <li>German Strategy for Adaptation to</li> </ul>	standing commission on adaptation to Climate Change			Klimalotse

		Climate Change (2008) • Action Plan on Adaptation (expected 2011)				
<b>DK</b>		Danish Strategy for adaptation to a changing climate (NAS)	Coordination Forum for Climate Change Adaptation			Testing support tools for municipalities
<b>FI</b>	seminars	Finish Adaptation Strategy (2005)	Finish Coordination Group for Adaptation to Climate Change			To be developed by 2011
<b>NL</b>	ARK steering committee and the ARK programme team	National adaptation strategy 'Make room for Climate' (2007)				
<b>NO</b>	.	Klimatilpasning I Norge (2008)			Cities of the Future	Web based guide for municipalities and regional level
<b>UK</b>		Climate Change Act 2008 Adapting to Climate Change: A framework for Action (2008)	Adapting to Climate Change" (ACC) Programme	Consultation on Framework	UKCIP's Local and Regional Adaptation Partnership (LRAP)	<ul style="list-style-type: none"> <li>• statutory reporting and the NI188</li> <li>• support tools by UKCIP</li> </ul>

*Please note: The table so far does not present a complete picture of the governance arrangements in the respective countries but gives examples for governance arrangements in the countries. A blank field does not indicate that no such governance arrangements exist, rather no arrangement is indicated by [--].*

#### *Patterns, modes and degree of vertical integration*

The most important and common aim concerning vertical integration is the raising of awareness and capacity building among territorial, regional and local actors.

The surveyed countries differ strongly in their administrative organisation and the responsibilities the different levels hold. Consequently, the importance and patterns of vertical integration differ in our case studies, depending on whether the country is organised more centralistic or more federalist.

When sub-national levels do not have competences in relevant legislation regarding adaptation, vertical integration seems to be interpreted as an instrument to raise awareness and built up capacity. Coordination units mentioned in the interviews merely serve to inform the sub-national levels, the dialogue is one-way or asymmetric (Denmark after the last administration reform in 2008, the Netherlands).

In countries where the provinces or counties do have influence on relevant legislation the sub-national levels seem to be included earlier, more intensively and have for instance influence to shape the adaptation strategy or agenda (e.g. Australia, Germany). Thus the role of the provinces, territories or regions differs depending on their competencies. The local level, i.e. municipalities, is less addressed during the policy formulation but are often addressees of awareness and guidance tools (Canada, Denmark).

Vertical integration mostly takes place within a sector or resort. Germany is a good example to use for describing such a sectoral integration between hierarchical levels. Because of the federal system, vertical integration is generally of high importance in Germany. In the case of adaptation to climate change, representatives from the inter-



ministerial working group (the horizontal coordination body) use the existing sectoral coordination structures to further integrate adaptation issues vertically. The current and planned work regarding climate adaptation is discussed in the sectoral federal-Länder bodies; e.g. in the conference of environment ministers, the conference of ministers of agriculture and the conference of regional planning ministers. The results are supposed to be supplemented and interconnected horizontally on national and federal level.

As the description of the different governance arrangements above has shown, in most cases vertical integration relies on soft coordination mechanisms with voluntary participation and are largely based on the network mode of steering (e.g. the participation of regions in policy processes). Instead of drawing on binding mandates, the involved state-actors from different levels mediate between institutionally separated arenas and foster the exchange of information (Benz and Eberlein 1999, 333).

Still the processes are mainly top-down induced, meaning that it is the national level that gives the first impulses and sets the frame for vertical coordination in adaptation governance. However, there are some arrangements that aim at fostering bottom-up coordination such as the network programmes. As outlined above, the UK stands out among our cases as the UK has introduced statutory arrangements of vertical integration. The statutory power of the government to demand reporting by regional and local authorities on their progress on adaptation represents a hierarchical mode of coordination.

### 3.5 KNOWLEDGE INTEGRATION

Governance arrangements and tools addressing the knowledge production, sharing, transfer and distribution play a high importance in adaptation governance in all surveyed countries. They always mark the first steps of adaptation governance and remain a crucial support for the further adaptation strategy and policy processes.

#### *Organization and institutionalization of knowledge brokerage*

Within our study we identified a wide range of organizing and institutionalising knowledge integration or brokerage in adaptation governance. One form of knowledge integration is the contracting of research projects to university and other research institutions. Contracting research projects is mostly undertaken by the administration (mostly the administrative unit that is responsible for climate change adaptation and the national coordination) that wants to get an overview over the research activities and results or has specific demands. In few of our cases contract research was used at the very beginning of the governance process. For example, in Austria the governance process started with a first study on the current state of knowledge that was commissioned by the Ministry of Federal Ministry of Agriculture, Forestry, Environment and Water Management. The same process occurred in Denmark, where the Energy Agency in 2002 set the first initiative and commissioned a scientific report which identified certain areas where adaptation activities were necessary in Denmark as well as possible structures for a successful adaptation process. In later phases contract research is often used for very specific and narrow questions, like the research project on adaptation indicators in Germany funded by the BMU and supervised by KomPass. The project focuses on a narrow question and is supposed to form the basis for evaluation of the German Adaptation Strategy and Adaptation Action Plan. Contract research often addresses the

implementation of specific sectoral adaptation measures; while the larger part of adaptation research is covered by *thematic research programmes*.

The setting-up of research programmes focussing on climate change adaptation is a very common governance arrangement among the surveyed countries. Examples include the programmes FinAdapt and ISTO in Finland, the ACRP in Austria, the CCIAD in Canada, Climate Change Adaptation Program in Australia or the Norwegian Research Programme on Climate Change and Impacts (NORKLIMA). These programmes seek to generate key knowledge about climate trends, the impacts of climate change, and how the respective countries can adapt to these changes. 'Klimzug' in Germany stresses particularly the regional aspect of climate adaptation. Within these thematic research programmes decision-makers to varying degrees have the possibilities to define and set research priorities, to select projects and to have a say in the design of the projects.

Large-scale *assessments* are another widely applied governance arrangement and predominantly deal with climate scenarios, climate change impacts, vulnerabilities and risks (examples: the UK scenarios UKCIP02, UKCP09; From Impacts to Adaptation: Canada 2007). Assessments almost always involve a large consortium of different research institutions (university, non-university research institutions, governmental research institutions, etc.) and are characterised by a comprehensive writing and review process. Often the aim of assessments is not to produce new knowledge but to collect, organize and consolidate existing research (e.g. From Impacts to Adaptation: Canada 2007). Recently increasing attempts are made for economic assessments of climate change impacts and climate change policies and measures (e.g. UK).

A few countries have established (independent) *scientific advisory bodies* to provide permanent advice to political and other decision-makers on adaptation aspects. The Adaptation Sub-committee (ASC) of the Climate Change Committee (CCC) in the UK is an example of such a newly established advisory body. The ASC provides advice on the climate change risk assessment to Defra and monitors and assesses the progress of adaptation policies in the UK (see its recent report Adaptation Sub-Committee (2010)). More commonly than setting up new advisory bodies, however, is the broadening of the agenda of existing advisory bodies and/or boundary organizations. *Boundary organizations* play an important role in the knowledge sharing and transfer for climate change adaptation and the mediation between the scientific and the political systems. Examples of this are the Environment Agency in AT, KomPass as organizational unit within the Federal Environment Agency in Germany, UKCIP in the UK, SYKE in Finland and the Information Centre on adaptation as organizational unit within the Energy Agency in DK. In Norway the boundary organisation, the Secretariat at the Directorate for Civil Protection and Emergency Planning (DSB), organises climate adaptation courses and seminars for representatives of national and local governments on a regular basis.

Another common form of knowledge brokerage is the *involvement of scientists or experts in adaptation governance and policy processes* such as the formulation of the National Adaptation Strategy or the operationalizing action plan or agenda. For example, in Finland seminars with various experts were held in the course of the development of the Finnish NAS. In Australia the National Climate Change Adaptation Research Facility NCCARF provides information for decision-makers in workshops at regular intervals. And the Climate Service Centre in Germany was invited to help elaborating the adaptation plan (expected in 2011) in order to integrate the newest scientific results.

Finally knowledge generation or more often *knowledge preparation* is also commonly undertaken by the respective sectoral administrations. For example Defra in the UK is responsible for the compilation of the UK Climate Change Risk Assessment.

**Table 4: dominant governance arrangements dealing with knowledge integration – an overview**

Country	Research contracts	Thematic research programmes	Assessments	Standing scientific advisory bodies	Involvement of scientists in governance processes	Boundary organization
<b>AU</b>	Garnaut Review	<ul style="list-style-type: none"> <li>Climate Change Adaptation Programme</li> <li>NCCARF</li> <li>CSIRO Climate Adaptation Flagship</li> </ul>	National Coastal Risk Assessment, Biodiversity Vulnerability Assessment	NCCARF		
<b>AT</b>	State-of-the-art-report commissioned by BMFLUW	<ul style="list-style-type: none"> <li>ACRP</li> <li>StartClim</li> </ul>		[--]		Environment Agency organizes participation process
<b>CA</b>		CCIAD	From Impacts to Adaptation: Canada 2007	[--]		
<b>ES</b>			Evaluacion preliminary de los impactos en Espana por Efecto del cambio climatico 2005			Meteorological service
<b>DE</b>		Klimzug		Climate Service Centre		KomPass
<b>DK</b>	First report commissioned by the Energy Agency				The Coordination Unit for Research in Climate is represented in the Coordination Forum	Information Centre on adaptation
<b>FI</b>		FinAdapt,ISTO			seminars with various experts held in the course of the development of the Finnish NAS	SYKE
<b>NL</b>		Climate changes Spatial Planning Programme, Knowledge for Climate		Platform Communication on Climate Change		
<b>NO</b>		NORKLIMA (2004-2013)		Center for International Climate and Environmental Research		Secretariat at Directorate for Civil Protection and Emergency Planning (DSB) dealing with climate adaptation
<b>UK</b>			<ul style="list-style-type: none"> <li>Scenarios UKCIP02, UKCP09</li> <li>Climate change risk assessment,</li> <li>Adaptation economic analysis</li> </ul>	Adaptation Sub-committee (ASC) of the Climate Change Committee (CCC)		UKCIP

*Please note:* The table so far does not present a complete picture of the governance arrangements in the respective countries but gives examples for governance

*arrangements in the countries. A blank field does not indicate that no such governance arrangements exist, rather no arrangement is indicated by [--].*

### *Patterns and modes of Science-Policy Interactions*

In adaptation governance a close science-policy interaction and facilitation of knowledge transfer is sought in most of the surveyed countries. Research on climate change impacts, vulnerabilities and especially options for adaptation is often strongly demand-driven research. In all countries decision-makers and/or stakeholders are involved in knowledge generation processes and its delivery, though to different degrees. For example, in the majority of our cases decision-makers or stakeholders are part of the steering committee or advisory board of a project, programme or assessment (e.g. in ISTO in Finland). In many cases decision-makers and or stakeholders are involved in the formulation and setting of research priorities and needs of single research projects, thematic research programmes and/or assessments. In UKCIP supported projects, stakeholders are even involved in setting projects goals and designs. In the Canadian assessment "From Impacts to Adaptation: Canada 2007" administrative decision-makers and stakeholders met with the lead authors of the assessment in several workshops in order to discuss the scoping, methods and content of the assessment. Further the assessment was supported by an advisory committee consisting of decision-makers from different areas and levels. The strong involvement of decision-makers and stakeholders in the assessment was a result of experiences with the former research programme CCIAP which was much more oriented at classical research programmes with limited science-policy-society interactions. In its dealing with climate change adaptation science and governance, the CCIAD ever more went from a rather decisionist approach of funding science and then transferring it to decision-making to an participative and co-productive approach of knowledge brokerage with a high degree of interaction between scientists, experts and political and societal decision-makers (CCIAP; Network; Assessment; Regional Adaptation Collaboratives). Similar trends towards a stronger involvement of decision-makers in policy-relevant adaptation research can be observed in many countries . This orientation towards stronger involvement of decision-makers in the formulation of research is also partly due to a change in focus/ knowledge needs addressed. While in the very beginning of adaptation governance a strong focus was laid on climate change scenarios and the assessment of vulnerabilities, the increasing focus on options for adaptation, the identification and assessment of concrete adaptation measures fostered stakeholder-led research.

Concerning the involvement of scientists and/or experts in adaptation governance processes different approaches could be identified within the surveyed countries. In Austria, for example, the process for the development of the NAS followed the model of a separate and linear sequence of scientific input and policy process: First, scientists and other experts in several workshop rounds developed options and guidance for actions for several sectors. The resulting document then served as an input to the participation process involving representatives of various ministries, of the provincial administration as well as stakeholders. Scientists were not involved in this participation process. This sequence very much resembles a decisionist model where science provides the knowledge and options (i.e. the factual basis) and decision-makers then decide on the basis of political priorities (i.e. the value basis). Interviewees in Austria unanimously praised this procedure and highlighted the advantage of being free from interest thoughts in the expert process and the following increased legitimacy for the policy

process. A different approach was chosen by Germany. In the process of the development of the German adaptation strategy scientists, other experts, administrative and political decision-makers were involved from the beginning in a joint process [discussion of the scientific basis and political options of actions]. This process such resembles a co-productive mode of knowledge brokerage.

### 3.6 STAKEHOLDER INTEGRATION AND PUBLIC PARTICIPATION

Similarly to regional and local administrative actors, non-state stakeholders (and especially organised stakeholders) are important actors for the successful implementation of adaptation policies and measures. Consequently the integration of those stakeholders in adaptation governance is another commonly addressed challenge. In addition stakeholders might also held specific knowledge on sectoral and/or regional and local circumstances, impacts and adaptation options that might serve the policy formulation process.

#### *Governance arrangements for stakeholder integration*

Though stakeholder involvement is of importance for adaptation governance in all surveyed countries, the countries differ in how far they include stakeholders in the formulation of adaptation strategies, programmes and policies. In Canada, for example, the formulation of the National Adaptation Framework was an interdepartmental process in which no stakeholder involvement took place. In Australia and all the surveyed European countries, in contrast, stakeholders are or were involved in one or the other form in the formulation of the respective NAS. In Denmark for instance the NAS was presented and discussed in a public hearing before the strategy proceeded to the parliament. In Austria stakeholders have various possibilities for participation, on the one hand in the broad participation process in form of a *series of workshops* that are organized by the Environmental Agency in order to formulate a draft NAS and on the other hand in form of a *consultation process*. While the former offers possibilities for joint deliberations the latter only allows for written statements. As in the participation process in Austria, in the majority of the surveyed countries stakeholder involvement takes place by the very same arrangements as horizontal and or vertical integration, i.e. the coordination with other federal ministries or departments and the coordination with other administrative levels (see above). Consultation processes are often organised by the boundary organisations. For example, KomPass in Germany or the Information Centre of Adaptation in Denmark announce and inform about the consultation and collect the statements. Afterwards the received statements are discussed within the horizontal and vertical coordination bodies.

As discussed above stakeholders are also often involved in governance arrangements tackling research and knowledge transfer. For example the Australian CSIRO Climate Adaptation Flagship Project<sup>5</sup> is within one of the four research themes closely working together with industry and farmer groups in order to reduce their vulnerabilities and also to enhance opportunities created by climate change and variability.

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<sup>5</sup> CSIRO stands for Commonwealth Scientific and Industrial Research Organization, which is Australia's national science agency.

Beyond that many countries have developed governance arrangements and tools for strengthening networking between various public decision-makers, stakeholders and experts in order to foster knowledge sharing and the development and implementation of adaptation plans and measures. Examples of such arrangements include the Regional Adaptation Collaboratives in Canada and the UKCIP's Regional Adaptation Partnership. Smaller participation arrangements involve specific non-state actors like insurance companies or associations. These strategic cooperations are perceived as fruitful in Germany and Norway, as the insurance sector has interest and expertise on risk evaluation and prevention regarding climate change.

**Table 5: dominant governance arrangements dealing with stakeholder integration – an overview**

Country	Workshop series	Temporary or permanent coordination bodies	Formal consultation processes / public hearing	Network programmes	Strategic cooperation/ partnerships	Involvement in applied research
<b>AU</b>		<ul style="list-style-type: none"> <li>stakeholder advisory group in the Department of Climate Change;</li> <li>range an and workshops</li> </ul>	Consultation in developing National Climate Change Adaptation Framework			CSIRO Climate Adaptation Flagship
<b>AT</b>	Participation process in the development of the NAS		Two consultation rounds			
<b>CA</b>				Regional Adaptation Collaboratives		Canadian Climate Impacts and Adaptation Research Network
<b>ES</b>		National Climate Council				
<b>DE</b>	Stakeholder conferences or stakeholder-dialogues ( 4-5 times/year on national or <i>Länder</i> level)		Online-Consultation to collect ideas regarding Action Plan on Adaptation (March 2011)		Cooperation with German Insurance Association	
<b>DK</b>			NAS presented in a public hearing before being adopted by parliament			
<b>FI</b>			Open seminar			
<b>NL</b>	Round table meetings, on national and on sub-national level	Ad hoc meetings with environmental NGOs, agricultural and forestry associations (etc.) during elaboration of NAS				
<b>NO</b>					Between insurance companies, municipalities and county administration	

UK			Consultation over the Adaptation Framework	UKCIP's Local and Regional Adaptation Partnership (LRAP)		In the frame of UKCIP projects
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*Please note:* The table so far does not present a complete picture of the governance arrangements in the respective countries but gives examples for governance arrangements in the countries. A blank field does not indicate that no such governance arrangements exist, rather no arrangement is indicated by [--].

#### *Patterns and modes of stakeholder integration*

In all our cases stakeholders that were involved in adaptation governance were well-established and well-organised interest groups (farmers associations, forestry associations, etc.) and non-governmental organisations (esp. environmental).

Participation of stakeholders in most cases of strategy or policy formulation means consultation where stakeholders have the possibility to comment and to discuss on adaptation strategies, policies, measures and the like. This consultation may also lead into the joint drafting of strategy or policy papers but the final decision-making rests with other political actors (e.g. Parliament, ministerial conference, etc.).

In other cases especially in the context of setting research priorities and designs as well as networking activities stakeholder integration may go beyond consultation to joint decision-making. Most characteristic of these governance processes with stakeholder involvement is their equality with other political and administrative actors.

#### *Involvement of the general public*

Besides stakeholder participation in several of the surveyed adaptation governance processes also the broader public<sup>6</sup> was consulted. This consultation may occur at different stages of the policy formulation process. In Austria, for example, the general public was consulted very early in the process of the development of the NAS as an additional source of input. A survey was announced widely with everyone's right to participate. However, a closer look at the analysis reveals that most of the participants had an academic or stakeholder background. More common than such early consultation, however, is the consultation of the broader public concerning the draft strategy or policy document. In the process of the development of the Spanish National Adaptation Plan the possibility was given to hand in statements on the draft plan. Similarly in Germany the next online consultation (regarding the Action Plan on Adaptation) is planned for February/March 2011. Also here responsible actors expect first and foremost organized stakeholders to participate. Interviewees explain that the broad public is neither aware of climate adaptation as an important political issue yet nor interested in such a strategic process.

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<sup>6</sup> Note that there is a plethora of measures and instruments for the information of the general public but that this stage of participation was not addressed by the study.

#### 4. COMPARING GOVERNANCE PATTERNS ACROSS COUNTRIES AND CHALLENGES

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Based on the stocktaking summarised above, this section compares the findings across the 10 countries and the four governance challenges. Some redundancies in section 3 have shown that most governance arrangements identified in the survey tackle more than one of the four governance challenges introduced in section 3. Examples of arrangements tackling more than one challenge are the participation process in the development of the Austrian NAS (which integrates state actors from different sectors and levels of government as well as non-state actors), and the Coordination Forum for Climate Change Adaptation in Denmark (which facilitates horizontal and vertical integration). Examples for governance arrangements focussing on one challenge include the Australian vulnerability assessment, the Canadian Intergovernmental Climate Change Impact and Adaptation Working Group, and the German standing commission on adaptation to Climate Change within the Federal-Länder Dialogue.

Furthermore we found that some governance arrangements were established anew (e.g. in the course of the development of adaptation governance such as the UKCIP and the Regional Adaptation Collaboratives in the UK) while others resulted from the broadening of existing governance arrangements (mostly in the context of mitigation policies) (e.g. the Spanish Coordination commission of climate change policies/CCPCC, and the German standing commission on adaptation to Climate Change within the existing Federal-Länder Dialogue).

Governance arrangements tackling the challenge of knowledge integration mark the first step of adaptation governance in all countries. Such arrangements include for example large-scale assessments on the impacts of and vulnerabilities to climate change that highlight the upcoming pressures. Other common arrangements in this respect are thematic research programmes and the participation of scientists and other experts in policy deliberations. Mostly in the course of the development of a National Adaptation Strategy further governance arrangements tackling all four challenges are set up. The coordination of different ministries or departments (i.e. horizontal integration) is addressed in all countries at least during the development of the NAS while the coordination across different levels is of varying importance in the different countries. In Canada, for example, the territorial or provincial levels were not included in the formulation of the National Adaptation Framework (though vertical integration takes place but through other governance arrangements). In other countries, such as Austria and Denmark, vertical integration has the same significance and is pursued by the very same governance arrangements as horizontal integration (e.g. by workshops series, temporary or permanent working groups). The same observation could be made for stakeholder integration. While in some countries, such as Austria and Finland, stakeholder participation takes place together with horizontal and vertical integration, in other countries stakeholder involvement is organised in separate settings. Interviewees from Canada state that participation of non-state actors in the process of the development of the NAS was of less importance.

The strategy document is often the (first) result of an intense phase of coordination on national level (2-6 years), it is a first though often weak political commitment, aims to guide the following activities and is therewith itself an important governance arrangement mainly for horizontal and vertical integration. In the course of the further development of adaptation policies and the fostering of implementing measures horizontal integration a range of further governance arrangements are used to coordinate and monitor the implementation (e.g. the Finish Coordination Group for Adaptation to Climate Change) and to enhance knowledge sharing, networking and capacity building



(UKCIP, Regional Adaptation Collaboratives, KOMPASS). The latter especially address the challenges of knowledge integration, vertical and stakeholder integration by joint mechanisms and procedures.

Table 6 summarizes the most commonly applied governance arrangements and their dominant governance modes.

**Table 6: Overview of governance arrangements and dominant governance modes**

Governance challenges	Types of governance arrangements	Dominant governance approaches & modes
Better integrate adaptation policies horizontally (across policy sectors)	<ul style="list-style-type: none"> <li>• Coordination bodies (temporary or permanent)</li> <li>• NAS development arrangements: workshop series; formal consultation 'climate-proofed' assessments; guidelines &amp; checklists;</li> <li>• National Adaptation Strategy or similar strategic document</li> </ul>	<ul style="list-style-type: none"> <li>• Intersectoral integration mainly during strategy development phase, afterwards usually sectoral approaches;</li> <li>• Predominantly soft coordination via the network mode of governance;</li> <li>• The hierarchical mode of governance is employed in a few cases</li> </ul>
Better integrate adaptation policies vertically (across levels of government)	<ul style="list-style-type: none"> <li>• Coordination bodies (temporary or permanent);</li> <li>• NAS development arrangements (see above)</li> <li>• National Adaptation Strategy or similar strategic document</li> <li>• Network programmes;</li> <li>• Reporting</li> </ul>	<ul style="list-style-type: none"> <li>• Bottom-up and top-down approaches</li> <li>• Predominantly soft coordination and network mode but also hierarchical modes of coordination</li> </ul>
Improve the knowledge-base of adaptation policies and facilitate participation	<ul style="list-style-type: none"> <li>• Thematic research programmes, assessments (impact, risks, vulnerability),</li> <li>• Contract research,</li> <li>• Boundary organisations, involvement of experts in governance processes;</li> <li>• Standing advisory bodies,</li> <li>• Temporary or permanent coordination bodies</li> </ul>	<ul style="list-style-type: none"> <li>• Strong tendencies towards participative and co-productive approaches, but also high appeal of a linear, decisionist model of science-policy interactions</li> </ul>
Better integrate concerned stakeholders and the broader public	<ul style="list-style-type: none"> <li>• Participation of stakeholders in governance processes, e.g. by workshop series,</li> <li>• Coordination bodies</li> <li>• Formal consultations,</li> <li>• Network programmes,</li> <li>• Strategic partnerships</li> <li>• Involvement in research (programmes)</li> </ul>	<ul style="list-style-type: none"> <li>• Mostly consultative, in a few cases decisional (esp. regarding knowledge integration)</li> </ul>

The modes of governance in most countries rely on soft coordination mechanisms, voluntary participation and action and on network or co-productive modes of coordination. With regard to horizontal integration, the survey showed that across all ten countries horizontal governance arrangements allow deliberation among equals whereas sectoral integration is simultaneously rather weak. In many national adaptation strategies vulnerabilities, adaptation needs and possible measures are listed separately for each sector with few considerations of synergies and conflicts. This sectoral organisation can be explained by the long-established responsibilities and competencies. Governance arrangements for horizontal integration thus mainly aim at informing, rising awareness and capacities / knowledge as well as aligning specific activities.

According to the above described sectoral handling of climate adaptation, vertical coordination often also takes place within these specific sectors and within existing

structures. The importance of vertical integration depends on the degree of federalism of the country. In countries where provinces have considerable responsibilities and competences in legislation, vertical coordination is more important, and therefore more arrangements for vertical integration are established. When sub-national levels do not have competences in relevant legislation regarding adaptation, vertical integration seems to be merely interpreted as an instrument to raise awareness and to build capacity.

In some countries (often in smaller and more unitary states), we found more hierarchical and statutory modes of governance. Most notably, the UK introduced a range of hierarchical governance arrangements alongside soft coordination and bottom-up approaches.

With regard to knowledge integration, the survey revealed a strong tendency towards a participative and co-productive mode of knowledge brokerage, where scientists, other experts, administrative and political decision-makers are involved in a joint process. Some countries though, pursue a linear approach, which separates the scientific input from the decision making process. This approach complies with the decisionist model of science-policy interactions.

The integration of stakeholders was mostly organised in a consultative setting, where stakeholders had the possibility to state their opinion about certain aspects of climate adaptation. In a few cases, especially regarding knowledge integration, the set-up was also decisional.

Since the frameworks and the implementation of adaptation measures are at the very beginning, arrangements presented in this paper are still largely in the making. The presented governance arrangements are and will be subject to continuous change. Nevertheless, most of the surveyed countries perceive their established governance structure as a good starting point and a possibly successful factor to overcome climate adaptation challenges with its given magnitude and complexity entangled with many different thematic areas. The strength of the adaptation process is seen in its organisational structure and governance arrangements; the exchange and collaboration of state-actors from different areas and different levels, the involvement of stakeholders, the close connection to the scientific community and all subsequently aligned actions, concerning raising of awareness, building of capacity or solving of conflicts of interests. However, the interviewees also emphasise other preconditions necessary to successful implementation which in most of the countries are still experienced as a restriction. First, a strong political commitment to climate adaptation supported by a binding legislative framework, where the latter is seen as a necessity in order to be able to convert planned adaptation measures into action. However, the binding framework is still missing or in preparation in most of the surveyed countries (exception: UK). The second precondition is the allocation of an adequate budget not only for research but also for the implementation of measures. Just now, in times of economic crises many interviewees raised concerns about continued financial support for the long-term policy of climate change adaptation.

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