

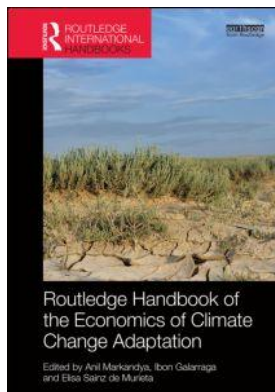
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REGIONAL AND LOCAL CLIMATE CHANGE ADAPTATION POLICIES IN DEVELOPED COUNTRIES

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19.1 Introduction

Adaptation to climate change requires multi-level actions at different scales – temporal (from short to long-term) and spatial (international, national, regional and local) – to be implemented by both public and private actors (i.e. decision makers, businesses, NGOs and individuals). In other words, adaptation constitutes a multi-level governance issue (Adger et al., 2005).

This chapter deals with the specific role and leadership of subnational authorities and policies in climate change adaptation, such as regions, provinces, cities and municipalities. By looking at the reasons and means of action at these scales of governance, the related challenges and success factors, as well as some concrete examples of implemented initiatives, we aim to give an overview of this issue in the context of developed countries. While adaptation has been primarily considered a problem specific to developing countries, we know today that developed states are also vulnerable to climate change. Indeed, their often presumed high adaptive capacity has been questioned following recent events, like the 2003 European heat wave or the 2005 Hurricane Katrina. Moreover, vulnerability and adaptive capacity differ widely across regions and populations (Wolf, 2011), leading to specific adaptation needs and contexts. As a consequence, a growing interest in adaptation in industrialized countries has progressively emerged from research and policy, including the regional and local levels.

19.2 Why is public action towards adaptation to climate change necessary at the regional and local levels?

Before looking at the specific need for action at the regional and local policy levels, we first have to explain why public action in general is necessary to adapt to the impacts of climate change. In this respect, the roles and functions of public actors in adaptation are multiple and well described in the literature (Aaheim et al., 2008; Agrawala et al., 2008; Tompkins et al.,

2010; Biesbroek et al., 2010; Hallegatte et al., 2010; Tubiana et al., 2010). We can summarise them as follows:

- i. Providing information, awareness and tools on climate change impacts and adaptation in order to stimulate adaptation actions by all concerned stakeholders;
- ii. Creating incentives for adaptation by non-state actors through regulations or market instruments;
- iii. Protecting the least able populations and individuals to cope by addressing the causes of vulnerability and/or by compensating for the unequal distribution of climate impacts;
- iv. Protecting and provisioning public goods such as nature conservation, flood protection infrastructures and early warnings of extreme events;
- v. Coordinating action and regulating adaptation spillovers in order to avoid negative externalities on vulnerability, i.e. maladaptation;¹
- vi. Mainstreaming adaptation into public policies on climate-vulnerable sectors.

In other words, adaptation policies are needed to anticipate climate change impacts and to compensate the limits of spontaneous (or autonomous) private adaptation, related to various factors such as: uncertainties and the lack of knowledge and of perception about the need to adapt, the absence of direct and/or short-term benefits of adaptation, the lack of adaptive capacity and the lack of consensus and coordination towards action (Stern, 2006; Biesbroek et al., 2010). Such anticipatory and proactive public initiatives constitute the so-called '*planned adaptation*' which results from a "*deliberate policy decision, based on an awareness that conditions have changed or are about to change and that action is required to return to, maintain, or achieve a desired state*" (IPCC, 2007), in contrast to '*autonomous*' or '*spontaneous adaptation*' which refers to "*adaptation that does not constitute a conscious response to climatic stimuli but is triggered by ecological changes in natural systems and by market or welfare changes in human systems*" (IPCC, 2007).

In this context, subnational governments have specific roles in the building and implementation of climate change adaptation policies for various reasons. First, in contrast with the governance of climate change mitigation that aims at global effects, most adaptation measures will need to address local needs and will provide local effects (Füssel, 2007; Isoard, 2011). Climate change impacts are deeply territorialised and will not threaten regions in a similar manner, hence adaptation has to be specifically fitted to local geographic and socioeconomic conditions and vulnerability: a coastal zone will not face exactly the same risks than an agricultural rural area, a mountainous region or a big city will, even if situated in the same country. Second, subnational authorities, especially the most local ones, are generally close to local stakeholders – e.g. businesses, community organizations, households – which can facilitate the understanding of the local contextual factors to take into account in adaptation decisions as well as the implementation of a participatory decision-making process (Corfee-Morlot et al., 2010). Third, as a large part of adaptation measures will occur at a decentralised level, the presence of a local adaptation framework is crucial for the efficiency of individual actions (Isoard, 2011). Finally, regional and local levels can innovate and experiment in elaborating policies and concrete measures, thus becoming in some cases 'laboratories for creative policies' (Puppim de Oliveira, 2009; Corfee-Morlot et al., 2010). In view of these features, subnational governments at the region, municipality and city levels are thus key-players to grasp regional and local specificities of climate change effects and to plan adaptation measures.

Beyond these general considerations, the role of subnational authorities, and particularly of regional governments, depends on the institutional structures of each country. In federal or decentralised states, such as the United States, Germany, Spain or Belgium, autonomous entities generally have a large part of the legislative power, including over climate-vulnerable sectors, and usually have a more significant role in developing regional adaptation. Westerhoff et al. (2011: 1079) claim that abilities and functions of the regional and local levels to plan adaptation depend on (i) the legal and political capacity to act on adaptation; (ii) the existence of financial and human resources for adaptation; and (iii) the ability of regional authorities to engage in internal and external networks for resources and information sharing (cf. Section 19.4.1: Context of Emergence of Subnational Adaptation Policies).

Box 19.1 A particular local adaptation challenge: Adaptation in cities

As centres of population and economic activity, cities may be particularly vulnerable to climate change and consequently constitute a key decision level for adaptation action. In Europe for example, three quarters of the population live in urban areas (EEA, 2012).

Because of their concentration of people and goods and the specific characteristics of cities, climate change impacts may be exacerbated in urban areas. Higher temperatures and heat waves for example have major expressions in cities because of the so-called 'urban heat island', i.e. a phenomenon of microclimate, notably created by the envelopes and arrangements of buildings, and leading to an increased temperature of the urban air compared to rural surroundings, that might reach up to 10 °C or more (EEA, 2012). Flood risk, already important in case of urbanisation in risk areas, may also be increased because of the high proportion of non-porous surfaces in cities (Carter, 2011). In addition, climate change may accentuate the problem of water scarcity with the occurrence of more frequent and severe droughts, as cities already compete with other users for water (EEA, 2012).

Moreover, cities are exposed to a number of indirect impacts of climate change, such as loss of jobs, income sources and quality of life in case of damages to infrastructures and interruption of services.

The city level is appropriate to adapt to climate change because this scale of governance is neither too small, as cities have policy means of action, nor too big, as they constitute integrated systems, including infrastructure networks and economic and social fabric (ONERC, 2010). In this respect, cities are generally competent in major policy areas for adaptation in the framework of urban planning and development, such as land use and transportation planning, building codes, water infrastructures, disaster prevention and response, public housing and social welfare (Corfee-Morlot et al., 2010).

19.2.1 Success factors of regional and local adaptation strategies and policies

A key element and general principle for a successful adaptation strategy is to tailor policies and measures to the specific regional or local climate conditions and political and socioeconomic contexts.

Besides this prerequisite, the scientific and grey literature identifies several factors that may play a role in facilitating the planning and implementation of adaptation policies, including

at the regional and local levels (Ribeiro et al., 2009; Isoard, 2011, EEA, 2012). These different factors are explained as follows:

- i. Raising awareness of the different non-state stakeholders (such as local communities, private sector organisations, labour unions and non-governmental organisations) and ensuring dialogue with them on various aspects of climate change adaptation is crucial in all vulnerable sectors, especially those with long lead times. Knowledge transfers are important for supporting the development of adaptation strategies, for communicating about these strategies and for facilitating the integration of adaptation at the regional and local levels;
- ii. Integrating new available scientific information about current extreme weather events, projections of climate change and assessments of vulnerability, impacts and risks into decision-making is a key factor for the formulation of an adaptation strategy, as well as translating this knowledge into relevant information at the regional and local scales;
- iii. Horizontal collaboration between different sectors or policy departments and vertical coordination between different administrative levels are necessary to a coherent adaptation policy framework (cf. Section 19.2.3. Multi-Level Governance and the Need for Coordination);
- iv. Developing and securing a sufficient resource base in terms of financial, human and institutional resources is essential for all steps of the adaptation process;
 - v. Measures that promote goals other than adaptation (e.g. nature conservation, regional or urban development, climate change mitigation) and deliver additional benefits (i.e. 'win-win' measures) are generally better accepted and possibly more easily financed;
- vi. Combining technological measures ('grey' or 'hard' measures) with soft (behavioural adaptation, participation of stakeholders, etc.) and green or 'ecosystem-based' measures (increase of ecosystem resilience) constitutes a solution to insure diversification and flexibility of adaptation responses;
- vii. Monitoring and evaluating the adaptation strategy or policy against a set of targets and objectives to assess progress and insure the implementation of measures is a key step of the process. Similarly, it is crucial to progressively review these objectives and the policy instruments to implement according to new knowledge and experience.

19.2.2 Obstacles to regional and local adaptation policies

According to the literature, different categories of obstacles and barriers, often intertwined, can hinder regional and local adaptation action (Ribeiro et al., 2009; Corfee-Morlot et al., 2010; ONERC, 2010; Biesbroeck et al., 2011; Carter, 2011; EEA, 2012). First of all, sub-national authorities are in some cases faced with jurisdictional and institutional obstacles such as a lack of mandate to address climate issues, non-adapted institutional designs for vertical and/or horizontal coordination and the existence of national or regional laws, rules or regulations that lead to maladaptation. Regarding this last point, such policies and actions are those that increase vulnerability, by being short-term sighted and/or inflexible (Carter, 2011). Examples are policies that accept or encourage development in exposed locations or unregulated water consumption in drought-prone areas. Political factors constitute a second category of possible barriers, for instance: short-term electoral cycles that do not favour long-time risk management, pressuring to maintain 'business as usual' development pathways and a lack of leadership and willingness to accept costs and behavioural change. Third, the lack of resources and funding may also constrain adaptation as well as inter-sectoral competition over budgeting

and difficulties to mainstream adaptation into budget lines (cf. also Section 19.3: The Cost and Funding of Adaptation at the Subnational Level). Finally, there are technical and cognitive obstacles. These may consist in a lack of understanding, an inadequate perception or even an ignorance of climate change risks. Scientific uncertainty, the deficiency of technical capacity or access to expertise, the lack of information about vulnerability at the regional or local scale and the weakness of information sharing about best practices of adaptation constitute other constraints of the same kind.

Of course, some of these barriers also exist at the national or supranational levels. However, it seems that these are particularly important at the subnational scales of governance because they are closer to adaptive action (Biesbroek et al., 2011). This is especially the case for the lack of financial resources or the lack of coordination between governments.

19.2.3 Multi-level governance and the need for coordination

Although the role of subnational authorities in adaptation policies is critical, we should not underestimate the importance of vertical integration and coordination of climate change adaptation between local, regional, national and supranational levels. Adaptation to climate change is naturally not a purely local governance issue but, as stated in previous sections, it is a multi-governance issue. Therefore, adaptation measures must be, on one hand, implemented at the different appropriate scales of the decision-making process and, on the other hand, specific regional or local measures must be consistent with the strategies at upper levels (Isoard, 2011) and not be constrained by national processes (Adger et al., 2005; Næss et al., 2005; Juhola and Westerhoff, 2011).

Actually, various sectors that may be affected by climate change are organised at different scales of governance, including subnational, national and supranational levels (such as the EU level), hence the importance of formal or/and informal coordination. Furthermore, some issues, such as water, coastal or mountainous management, even if relevant at the local scale, require cross-boundary actions and thus cooperation between concerned neighbouring countries. Without such coordination mechanisms, policies and all efforts may become ineffective or even counterproductive. Table 19.1 illustrates how multi-level governance of adaptation to climate change may operate in practice here in the urban context.

While this multi-level nature of adaptation governance is necessary and acknowledged as an essential principle of good practice, there are some gaps in implementing it. Structural and operational challenges are indeed numerous, notably in terms of decision-making and budgets structures as well as communication and transparency cultures (EEA, 2012). For example, while most (European) national adaptation strategies recognise the importance of participation and of taking measures at the most appropriate scale, involvement of regional and local representatives in the building of these strategies has not yet become widespread (Biesbroek et al., 2010). In addition, roles and responsibilities at regional and local levels are rarely clearly assigned.

Furthermore, actions at national and global scales of governance can really impact the success of adaptation at regional and local scales, depending on existing institutional frameworks and power structures (Næss et al., 2005; Tompkins and Adger, 2005; Urwin and Jordan, 2008; Corfee-Morlot et al., 2010). For example, the absence of a national adaptation strategy implies that authorities have to operate without central funding, data and expertise and thus, to mobilise other resources (Westerhoff et al., 2011) (cf. also Section 19.4.1. Context of the Emergence of Subnational Adaptation Policies).

Table 19.1 Multi-level governance of adaptation to climate change

Local action	Regional action	National action	European action
←			
<i>Implementing action</i>			
<ul style="list-style-type: none"> • Planning and implementation of local adaptation strategies • Mainstreaming of adaptation concerns into other policy areas • Spatial integration of adaptation needs through urban planning • Local emergency plans • Allocation of municipal resources and raising of other funds • Upgrading local infrastructure to make it resilient to climate change • Engaging civil society and private actors 	<ul style="list-style-type: none"> • Providing incentives, funding and authorisation to enable local action • Addressing inter-municipal and urban-rural relations of climate change impacts and vulnerabilities • Developing and implementing with cities regional approaches, e.g. in river basins • Ensuring regional coherence of local/municipal plans and measures 	<ul style="list-style-type: none"> • Providing a supportive national legal framework, e.g. appropriate building standards • Mainstreaming of urban adaptation into the different national policy areas and the national adaptation strategy • Funding of local adaptation measures • Providing national information related to climate change and regionally downscaled information • Funding of research and knowledge development for urban adaptation • Supporting boundary organisations who link science and policy to local adaptation needs • Adjusting the degree of decentralisation of competencies and authorities 	<ul style="list-style-type: none"> • Providing a supportive European legal framework • Mainstreaming of urban adaptation needs into the different European policy areas, e.g. cohesion policy • Funding of local adaptation measures as well as knowledge development for urban adaptation • Providing European and global information related to climate change • Enabling and coordinating exchange of knowledge and experience across national borders • Addressing and coordinating cross-border adaptation issues
<i>Supporting action</i> →			

Source: EEA 2012, Table 4.1: 96

19.3 Cost and funding of adaptation at the subnational level

Some climate change adaptation measures can be implemented at relatively low cost. Take for example those linked to behavioural and institutional change² such as mainstreaming adaptation into all policy areas, or applying cheap ‘safety margins’³ in calibration of infrastructures

in the design phase (e.g. drainage systems, dikes or sea walls; Hallegatte, 2009). Other measures require major investments, especially for building and adapting infrastructures. In addition, costs are not confined to material expenditures: ex-ante and ex-post costs of adaptation policies must be taken into account, such as costs of the analysis of vulnerability and the planning process, communication efforts and monitoring of the policies (ONERC, 2010).

Besides disparities in financial capacity across regional and local authorities, a major problem concerning adaptation is that the methods of economic assessment for the needed investments are still complicated and incomplete. Indeed, calculating the benefits of an adaptation that may occur several decades after action is problematic. Furthermore, it is not always possible to assign monetary value to all costs and benefits. As a consequence, this lack of information may constitute a barrier for implementing adaptation measures, even if it is generally admitted that anticipatory actions can prevent huge future costs (Stern, 2006).

However, some public funding is available at different governance levels and may partly alleviate this operational barrier. It includes local budgets and national or supranational funding. Furthermore, different economic instruments are potentially conceivable, such as climate-based taxes and charges, subsidies and budget allocations, and removal or modification of subsidies or taxes with harmful impacts and of instruments that create incentives to maladaptation (such as insurance systems that work against risk management) (Mickwitz et al., 2009). In the European Member States, adaptation activities in regions, cities and municipalities can be covered by already existing EU financial mechanisms (Ribeiro et al., 2009), for instance the Rural Development Fund in the agriculture and forestry sectors, LIFE+ for environmental and nature conservation projects, INTERREG for very various regional development projects (spatial planning, environment, innovation, etc.) or European Commission Research Funding. Furthermore, the European Commission has proposed, for the period 2014–2020 to allocate at least 20% of the overall Multiannual Financial Framework for climate change mitigation and adaptation (the overall total budget is €960 billion). In this respect, a better communication of these funding opportunities might be useful as subnational authorities are not always aware of them.

Furthermore, private funding constitutes another possible and complementary option. As infrastructures, flood defences and natural disasters management are mostly financed by public authorities, public–private partnerships may offer a solution to overcome operational and financial constraints (Agrawala et al., 2008). These partnerships can also be implemented for research and development (see also Box 19.2: Boundary Science–Policy Organisations). Nevertheless, such market mechanisms are for the time being less developed for climate change adaptation than for mitigation (EEA, 2012).

Finally, regional and local authorities can benefit from existing tools and methodologies developed by other actors, which will avoid some of the costs associated with the adaptation process (ONERC, 2010).

19.4 Regional and local adaptation strategies, plans and programmes: Characteristics and concrete examples

As adaptation to climate change has gained interest at the political level, several industrialised countries have developed national adaptation strategies and policies (Biesbroek et al., 2010; Isoard, 2011; Moser, 2011). Climate change adaptation strategies are defined as “a general plan

of action for addressing the impacts of climate change, including climate variability and extremes. It will include a mix of policies and measures with the overarching objective of reducing the country's (or region or city/municipality's) vulnerability" (Niang-Diop et al., 2005:186 cited in Biesbroek et al., 2010). A similar trend is visible at the regional and local levels, including in cities. Indeed, specific adaptation strategies or plans have been lately elaborated and information on potential climate change impacts has been integrated into some planning or development programmes (Juhola and Westerhoff, 2011). Unlike national top-down initiatives, regional and local adaptation efforts are not always officially described as 'climate change strategies', which may complicate their identification (Ribeiro et al., 2009).

In Europe, the European Commission published a Green Paper in 2007 and a White Paper in 2009 about adaptation to climate change (EC, 2007; EC, 2009) as well as a European adaptation strategy in 2013 (EC, 2013). These documents acknowledge the need to implement such comprehensive strategies at both national and lower levels of governance. In 2009, 31 formal regional and local adaptation strategies were identified in the European Union (Ribeiro et al., 2009), i.e. in France, Germany, the Netherlands, United Kingdom, Sweden and Spain. These initiatives were developed by subnational governments with varying levels of autonomy (for example *länders* in Germany, *comunidades autónomas* in Spain, countries in the unitary state of the UK) and large cities and agglomerations. Forerunner regions in this field were Andalusia (Spain), North-Rhine Westphalia (Germany) and Rhône-Alpes (France) (Isoard, 2011). Since then, other strategies and plans have been prepared in regions (such as in Belgian Regions or Catalonia) and cities (e.g. Copenhagen and Helsinki) (European Climate Adaptation Platform website). Furthermore, other adaptation efforts have been elaborated independently of the formal frameworks of strategies and plans, such as health warning systems and heat action plans.

We can find a similar evolution in industrialised countries outside Europe. In the United States, state governments have started considering adaptation in their climate actions plans and/or developing comprehensive assessments and planning, although these efforts vary considerably across U.S. regions (Moser, 2011). Dispersed initiatives also exist in sector-specific policies, for example in coastal management. In Canada, in the absence of federal leadership and of a national strategy or plan, provinces and municipalities have developed their own plans, strategies and programmes, take for instance Yukon, Nunavut or Quebec (Dickinson et al., 2011). In parallel, municipal initiatives are emerging in partnership with the Federation of Canadian Municipalities and the network 'ICLEI-Local Governments for Sustainability Canada'.

19.4.1 Context of the emergence of subnational adaptation policies

As briefly illustrated by the cases in the previous section, regional and local adaptation strategies and policies have emerged in the presence or absence of official national adaptation strategies or legal frameworks. While some subnational actions were stimulated and/or harmonised by national adaptation initiatives, others were developed before or in parallel with the national process (Ribeiro et al., 2009). Moreover, as already stated, the power and capacity of subnational authorities in implementing adaptation measures depends on the institutional dynamics of each country.

In some cases, regional and local institutions can surpass national-level objectives and be forerunners. This is the case, for example, of the province of Ferrara in the Region of

Emilia-Romagna in Italy, where provinces are competent to design and implement several sectoral regional plans and policies and where no national adaptation strategy has been developed (Westerhoff et al., 2011). In the absence of formal institutions to address climate change adaptation, regional and local governments must be able to access funding, information and best practices, in particular through participation in networks (for example NGO networks, local and municipal governments' associations or EU-funded research programmes). Networks can also facilitate local initiatives in countries that have a national adaptation strategy or plan. For instance, in Finland, the national strategy does not assign responsibility to sub-national authorities. Consequently, voluntary regional and local initiatives emerged (Juhola and Westerhoff, 2011) and inter-municipal networks allowed smaller municipalities to benefit from the needed resources (Westerhoff et al., 2011). In the United States, resources, leadership and staff for regional adaptation initiatives come from the state level since the federal government does not provide coordination in this field (Moser, 2011). Some U.S. local initiatives emerged independently, sometimes in relation to regional initiatives, such as New York City, which made use of a regional vulnerability assessment, whilst others were initiated or supported by networks, i.e. the 'Center for Clean Air Policy' and 'ICLEI-Local Governments for Sustainability' (Moser, 2011).

In other cases, national institutions facilitated regional and local approaches to adaptation. For instance, the UK has established a legal framework to allocate funding: the United Kingdom Climate Impact Programme (UKCIP) and the UK Government Department for Environment, Food and Rural Affairs (DEFRA) promote 'Regional Climate Change Partnerships', the multi-actor institutions responsible for regional action. In addition, UKCIP supports projects led by local authorities by providing guidance to them. In this respect, UKCIP plays a central role by providing knowledge, tools and best practices relevant to regional and local decision-making. Furthermore, local authorities are encouraged to consider adaptation through the local government performance framework that contains a national indicator on 'planning to adapt to climate change' (Boyd et al., 2011). As another example, the Australian National Climate Change Adaptation Program provides guidelines, planning tools, and information as well as a funding program ('Local Adaptation Pathways Program') to assist local governments in their adaptation initiatives (Smith et al., 2011).

Furthermore, apart from these linkages between different scales of governance, the elaboration of an adaptation strategy or policy emerged in some cases from wider regional or local (mitigation) climate change or sustainable development strategies, for example in the cities of Madrid, Hamburg and Manchester (Carter, 2011) or in regions and cities in France (Bertrand and Rocher, 2011).

Other motivating factors to develop and implement an adaptation strategy, including climate and non-climate triggers. Climate change (either real or perceived) and experience of extreme weather events constitute a frequent motivation (Ribeiro et al., 2009; Tompkins et al., 2010; ONERC, 2010; Moser, 2011). The proximity with a region that is implementing adaptation measures and the existence of a political leadership in environmental and sustainable development issues are other possible drivers for action (ONERC, 2010; Moser, 2011). In addition, non-climate-change-related legislation may also produce adaptation 'by-products', such as regulations about water efficiency (Tompkins et al., 2010).

The different motives for action are not always explicitly mentioned in strategies and policies (Biesbroek et al., 2010; Tompkins et al., 2010), a situation that might hinder comparison between case studies.

Box 19.2 Boundary science-policy organisations: A support to subnational adaptation policies

As explained, network membership can facilitate the emergence of adaptation strategies and policies at the regional and local levels by providing access to funding, information and best practices. In particular, science-policy interface is a critical issue in response to a deficiency of relevant scientific and technical information at the subnational level (cf. Section 19.2.2: Obstacles to Regional and Local Adaptation Policies). In this respect, the establishment of science-policy organisations, or so-called ‘boundary’ organisations, in collaboration with upper levels of governance, is often promoted as a possible useful support (EEA, 2012). Indeed such institutions are specifically charged with linking research and policy needs by translating scientific knowledge into information and tools adapted to local demands.

Several boundary organisations and networks have been developed or are in preparation in different countries, for example (Corfee-Morlot, 2010):

- United Kingdom Climate Impact Programme (UKCIP): established in 1997 by the UK government and based at the Environmental Change Institute at the University of Oxford, UKCIP coordinates and influences climate change impacts research and shares the outputs with stakeholders (public and private, at the different scales of governance) in a useful way, by spreading information and developing tools.
- Ouranos (Quebec, Canada): initiated in 2001 by the provincial government of Quebec, Hydro-Quebec (a publicly owned power generation and distribution company) and other regional partners (e.g. academic institutions), this network of multidisciplinary scientists and professionals aims to develop and use climate change knowledge to inform and advise local and regional decisions on adaptation.
- New York City Climate Change Program (U.S.): the result of a science-policy collaborative exchange that has co-produced scientific assessments, drawing on prior work conducted at the national level, notably on the knowledge and the network of experts that was created through a U.S. national assessment effort.
- Club ViTeCC (France): launched in 2008 by the Mission Climat of Caisse des Dépôts (CDC, a national institutional investment bank that also manages public infrastructure investment), in cooperation with two French organizations – Météo-France and the French National Observatory on Climate Change Impacts (ONERC) – Club ViTecCC collects, translates and shares results on both mitigation and adaptation with regions and cities and also companies of public services.
- Competence Centre on Climate Impacts and Adaptation – KomPass (Germany): compiles the latest research findings and uses them to develop target group-specific information products on adaptation activities and policies, through databases and best practice examples.
- Factory for Adaptation Measures Operated by Users at Different Scales – FAMOUS (Austria): project to facilitate the adaptation to climate change in Austrian provinces, regions and cities by better understanding the multi-level governance of adaptation in Austria, and by developing, applying, refining and disseminating tailor-made adaptation toolkits, developed based on experiences with similar guidance tools that can be found across Europe, and in close cooperation with local stakeholders.
- European Climate Adaptation Platform CLIMATE-ADAPT: created in 2012, hosted by the European Environment Agency and developed by the European scientific and policy making community, this online platform has been designed to support policy-makers at EU, national, regional and local levels in the development of climate change adaptation measures and policies. It shares information on current and future vulnerability and expected climate change in European regions and sectors, regional, national and transnational adaptation activities and strategies, adaptation case studies and potential adaptation options, tools that support adaptation planning and research projects.

19.4.2 Characteristics of subnational strategies and plans

Adaptation strategies and plans focus on different sectors, depending on regional and local vulnerability. Nonetheless, frequent key sectors are landscape, spatial planning and water management (e.g. flooding, urban water disposal, sea level rise, droughts) and health (e.g. heat stress), followed by biodiversity (Ribeiro et al., 2009; Isoard, 2011; Moser, 2011).

Concerning the development process, the preliminary studies and drafts of the strategies or plans are led internally within public administrations or in some cases subcontracted to consultants (for example in the UK, France or in Wallonia, Belgium), notably depending on whether internal resources and expertise are available. Consultative processes have been mentioned in most regional and local strategies, but there is not always detailed information about the organisation of stakeholder participation. Furthermore, involvement of the wider public is still limited (Ribeiro et al., 2009; Moser, 2011). The scientific background of strategies depends on climate change scenarios provided by the national meteorological services or boundary organisations, vulnerability assessments and other available expert knowledge or studies. As a consequence, climate scenarios and methods are not harmonised.

Stages of progress differ between regional and local initiatives. Most of them are at the stage of diagnosis through vulnerability assessments and of formulation of recommendations, but more concrete action plans are emerging. However, little information is available about implementation of specific policy instruments, assignments of specific responsibilities to different actors, costs and needed resources for adaptation measures, as well as monitoring processes.

Box 19.3 Spatial planning: A key instrument for adaptation to climate change at the subnational level

As mentioned, regional and local adaptation strategies often refer to spatial planning in order to anticipate and prevent climate change impacts. Spatial planning, defined as the “comprehensive, cross-sectoral, coordinating spatially oriented planning by the public sector” (Rannow et al., 2010: 160), is indeed one of the main public policy areas for regions, cities and municipalities in which to integrate adaptation measures into future land use and the different involved sectors.

First, land-use decisions may truly affect, positively or negatively, the vulnerability of urban dwellers and infrastructures to climate change (Corfee-Morlot et al., 2010). For instance, spatial planning plays a role in preventing flood risk by restricting building in flood plains, maintaining flood retention areas and minimising impermeable surfaces. Another possible measure to reduce vulnerability is building networks of green areas. For example, according to the planning law in Copenhagen, all flat roofs must be greened in new buildings. The city of Malmö in Sweden uses a green scoring factor for new urban developments that ensures a certain green space proportion thanks to different solutions, scored according to their efficiency (EEA, 2012).

Second, regional and local authorities usually have spatial or urban planning departments, allowing the creation of new institutions (Sanchez-Rodriguez, 2009).

In addition, spatial planning is also a key policy area to address mitigation to climate change and consequently has a significant potential to combine both approaches and to search for synergies (Biesbroek et al., 2009).

Note that incorporating climate assessment into planning may generate some direct and indirect costs, such as impacts on land and property prices and increased construction development and insurance costs, even if early action should be more cost-effective than delaying it (Wilson, 2006).

19.5 Conclusions

In this chapter we identified the reasons behind why the subnational level is crucial for elaborating and implementing adaptation policies and presented some examples of domains of action. However, adaptation initiatives are quite recent and the realisation of concrete measures remains at an early stage. In order for regional and local authorities to take their role and responsibility in hand, a number of challenges are still ahead.

We mentioned the different kinds of obstacles that currently slow down the process: jurisdictional-institutional, political, technical-cognitive and financial barriers. However, solutions and success factors exist, though they require leadership and political commitment in fostering adaptation in the policy agenda and investment in building adaptive capacities. The framework in favour of adaptation has to be coherent across the different scales of governance through coordination mechanisms in order to promote synergies in a common effort and avoid conflicts and counterproductive initiatives. This vertical integration is necessary at the different stages of the adaptation process, e.g. the preparation and implementation phases of policy process.

Regional and local authorities have the responsibility to raise awareness in all concerned stakeholders (including the private sector and citizens) of climate change in general and adaptation more specifically, in addition to mitigation. Moreover, funding research on vulnerability and adaptation is necessary, but it is also critical to promote knowledge transfer and translation into relevant and useful information. In this respect, relevant authorities at both the subnational level and upper scales of governance have to engage in bridging mechanisms between science and policy-making, in particular with the support of boundary organisations. The establishment and functioning of such institutions constitute an example where multi-level coordination can operate. Possible outputs of the translation of scientific data are the development of guidance and tools to facilitate vulnerability assessment and choice of adaptation measures. On this matter, the exchange of lessons learned from successful adaptation measures is interesting and needed for guidance. However these lessons must be assessed according to the different contexts of local and regional situations, with regard to demography, climate and environmental impacts, economic characteristics, cultures and values (Isoard, 2011). Developing indicators of vulnerability and of adaptation success is also a key aspect to work on. Indeed, the lack of such indicators, especially those of success, hampers an efficient monitoring process of adaptation policies and measures, which is essential for a flexible adaptive approach.

Finally, funding of adaptation measures still raises lots of unanswered questions, notably who (which governance level) should pay for what (research, infrastructures, etc.). To overcome the obstacle of uncertainty and prevent competition for financial resources, the responsible authorities can choose to implement 'no-regret' or 'low-regret' options that bring benefits in all climate change scenarios, or win-win solutions, that provide benefits to sectors and domains other than climate change adaptation (such as improvement in public-health systems or increase of green spaces). Others options are reversible measures that allow a strategic change

in the short-term (for instance, restrictive land use planning), and measures with a safety margin, that reduce vulnerability at low cost, for example in designing infrastructures. Furthermore, it is also crucial that regional and local authorities better mobilise the available opportunities of funding in public budgets or possibly develop new opportunities with private actors.

Notes

- 1 Maladaptation is increasing risks and vulnerability from adaptation, or more precisely “action taken ostensibly to avoid or reduce vulnerability to climate change that impacts adversely on, or increases the vulnerability of other systems, sectors or social groups” (Barnett et al., 2010: 211).
- 2 These measures are qualified as ‘soft’ measures in comparison with ‘hard’ measures linked to technological and infrastructural options.
- 3 The design of projects with an additional capacity to cope with climate variability and climate extremes events via a safety margin, for example, by using over-pessimistic climatic scenarios.

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