Chapter 1
Adaptive Capacities of European City Regions in Climate Change: On the Importance of Governance Innovations for Regional Climate Policies

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Abstract The higher the adaptive capacity of a region, the lower its socio-economic vulnerability is. Regional adaptive capacity is dependent on conditions such as economic power, technology, knowledge, institutions, infrastructure, and social equity. Not only are the impacts of climate change regionally very diverse, but the regional conditions to adapt to climate change are too. The paper discusses the implication of knowledge, institutional and infrastructure conditions of adaptation and the interdependencies of these conditions. Empirical outcomes of the case study in Northern Hesse (Germany) give some examples for the challenges of establishing regional governance innovations to handle these interdependencies. Another dominant condition of adaptive capacity is the discursive frames of regional climate change. While in international agreements and policy advice, resource-intensive economies and lifestyles are criticized as the main polluters, climate change debates at the regional level stress the options of climate change to strengthen regional economic competition. The paper suggests a perspective on multi-level governance and a perspective on policy integration for climate change adaptation to create a wide analytical view on these complex factors.

Keywords Adaptation · Adaptive capacity · Climate change governance · Policy integration · Regional governance · Urbanization · Vulnerability

Introduction: Adaptation Policies for European Regions

In the terms of the IPCC, adaptation policies are policies that intend to enhance adaptation. It defines adaptation as, "adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates

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harm or exploits beneficial opportunities" (IPCC 2007: 869). While global climate change is defined as a crisis of resource-intensive economies and lifestyles, the impacts at the regional level are defined as an environmental crisis and regional climate change policy stresses options for efficient management of resources, based on economic strategies, which are shaped by the search for adaptation strategies that allow the continuation of urban lifestyles and patterns of consumption.

The notion "adaptation" was introduced by the United Nations Framework Convention on Climate Change at the Rio conference in 1992, where two main categories of response to climate change were established: mitigation and adaptation. Adaptation was not defined as precisely as mitigation and was used in several interpretations and there is still no coherent theory of adaptation. In the beginning, the concept of adaptation was used in discussions on how to cope with floods. The terms "coping", "risk management" and "vulnerability reduction" were used in a similar way to "adaptation". Climate change is pushing people beyond the limits of existing coping strategies in many places, but not in all places, and it will happen in different time periods. Designing adaptation policies and implementing them at the local level therefore remains a challenge for policymakers who differ in terms of how urgently they need to provide adaptation measures. Social vulnerability arises both from the regional impacts of climate change and from the social, political and economic responses to these changes. Adapation capacity therefore depends on regional resources and climate change discourses.

Not only do the impacts of climate change vary by region, but the definitions of climate change, vulnerability and adaptation do, too. The debate on adaptation and which strategy needs to be adopted has grown in complexity and is closely associated with the concepts of vulnerability and resilience and "each of these concepts has its own unique community of practice and research" (Schipper and Burton 2009: 3). Socio-economic and political factors determine regional and individual vulnerability. Adaptation is facilitated by reducing vulnerability and, conversely, adaptation reduces vulnerability (Kelly and Adger 2000). Many studies on climate policy highlight a strong interrelation of adaptive capacity and governance as an innovative form of government: "Interventions in social–ecological systems immediately confront issues of governance" (Lebel et al. 2006: 19). Adaptation policy has to handle questions such as: Who decides what should be adapted? For whom is adaptation to be managed, and for what purpose? Decision-making in the field of climate change adaptation is connected with multiple potential conflicts of various stakeholders.

Governance is a mode of conflict solving and ascertaining the priority of political decisions. Its outcome of concrete actions takes place in terms of management of regulation. The essence of governance is its focus on governing mechanisms, which are not based on recourse to the authority and sanctions of government. It involves recognizing the limits of government (Stoker 1998: 18). The governance perspective draws attention to the increased involvement of the private and voluntary sectors in service delivery and strategic decision-making. The normative link of governance and adaptation is the concern with "active" citizenship. Adaptation to climate change is interpreted as the responsibility of every citizen. An effective

Fig. 1.1 Conditions of adaptive capacity (according to Smit and Pilifosova 2001)

realization of adaptation measures requires a high acceptance of the chosen strategies and this acceptance can be reached through the participation of a wide range of non-state actors in decision-making processes. Governing from the governance perspective is always an interactive process because no single actor, public or private, has the knowledge and resource capacity to tackle problems unilaterally (Stoker 1998: 22). This is especially relevant for socio-ecological problems such as the regional impacts of climate change.

In this paper I will pursue the question: What are its potentials and constraints for a sustainable climate change policy? My considerations focus on the presumptions of the discursive connection adaptive capacity and (regional) governance. I argue that the hegemonic definitions of prospects and risks of regional climate change frame possible adaptation policies. To discuss this argument I refer to some preliminary results of a case study on the adaptation policy of the Northern Hesse region (Germany), which is part of a research project on the acceptance of adaptation strategies and regional governance at the University of Kassel. My conceptual reference is the argument of Smit and Pilifosova (2001), who outlined six conditions of the adaptive capacity of a region, which are strongly interconnected. They argue that by increasing the impact of these conditions, the scope of action for adaptation policy will increase, too.

To achieve the aim of increasing the conditions of adaptive capacity (see Fig. 1.1), it is necessary to coordinate the different priorities of these conditions. For example, not all vulnerabilities can be solved by technology, and the process of innovation can be very slow. I will outline only three of these conditions of adaptive capacity: knowledge, infrastructure, and institutions.

Knowledge: What Are the Dominating Narrative Frames of Regional Climate Policies?

The impacts of regional climate change within complex processes of global warming and local climate variability confront urban development and regional governance with various problems (Eliasson 2000). The implications of ecological and social

interactions at the local level and how to regulate societal nature relationships in urban areas are not well known (Bauriedl and Wissen 2002). The Fourth Assessment Report of the Intergovernmental Panel on Climate Change emphasizes the human impact on global climate change. Taking this into consideration, future research on climate change has to focus on the interconnections between global emissions of greenhouse gases and concrete human activities, and built-up spatial structures in regional contexts. Knowledge about these complex interactions is comparatively low. This means that climate researchers need to downscale their knowledge about climate change scenarios from a global to a regional scale, while social scientists have to upscale their knowledge about socio-economic transformations as a condition for increased resource consumption from a local to a regional and global scale.

There is huge uncertainty about the direct impacts of climate change, e.g. the scope of changes, the differences by region, or the speed of the forecasted processes. There is also uncertainty about the indirect impacts of climate change, e.g. the risk of epidemics. And there is also uncertainty about the secondary impacts of the mitigation and adaptation activities chosen and the interdependencies of their ecological and social impacts. Climate change policy has to argue with a very weak knowledge base. Policymakers prefer precise data from climate change scientists to legitimize (economically confirmed) coping strategies. But climate change scientists provide qualitative knowledge, which is structured by powerful notions such as "disaster risk", "vulnerability", "resilience", and "adaptation". And these notions are open to multiple interpretations as to how to act.

Knowledge production by scientists in cooperation with policymakers has recently been the most powerful contribution to climate change policy (see, for example, the awareness of the IPCC Reports). Climate change researchers are recognized for environmental governance if they are formulating policy advice for required mitigation and adaptation measures. A proven practice to generate policy-relevant scientific knowledge is to map the impacts of climate change and to identify the most vulnerable regions in order to clarify the importance of local activities and environmental governance. This practice of mapping vulnerable regions increases the pressure on decision-makers to adapt to climate change. But it creates a regionalized ranking of vulnerable regions, too, and motivates stakeholders of "low vulnerable" ranked regions to do nothing and not adapt. Northern Hesse is one of the German regions qualified as low vulnerable, with the consequence that regional climate change scenarios generate only little feedback in the media and the political debate.

While scientists and ecologists transform the uncertainty of climate change knowledge in a discourse on climate risk, regional managers and entrepreneurs transform this uncertainty in a discourse on the possible benefits of climate change. Climate change is being reframed as an opportunity for innovation, new markets and enterprises. Regional impacts of climate change are interpreted in the context of regional development policy as win-win opportunities that can benefit industry and the climate alike. Frequently this innovation-based climate policy approach is focused solely on technological innovations, largely ignoring social or governance innovations (PEER 2009: 11).

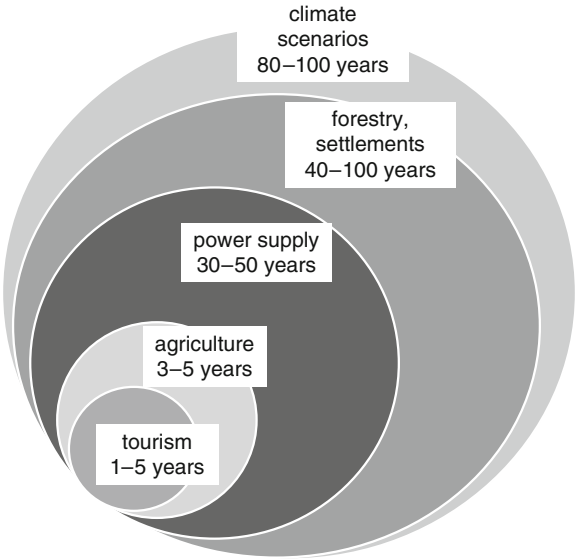

Fig. 1.2 Planning horizons in different sectors of regional development and climate scenario horizons

A sustainable regional adaptation to climate change needs an integrated perspective on development sectors and economic clusters. A vertical integration of policy fields draws the attention to possible contradictions of solely sectoral adaptation strategies. For example, in the adaptation policy process in Northern Hesse, it was immediately obvious that the long-term time horizons of the regional scenarios are not suitable for most of the sectors and clusters involved (see Fig. 1.2). Research is needed for both short-term effective adaptation strategies and long-term effective mitigation and adaptation strategies. The competence of spatial planners can be extremely relevant for regional climate policy, because they work with an integrative perspective on different development sectors and time horizons. The effects of uncertain scientific knowledge are not specific for climate policy. Decision-makers have to handle the uncertainty of future developments in the context of demographic, economic and technological development, too. But decision-makers in particular formulate a high necessity of certain scenarios for small-scale, short-term horizons, especially in the policy field of climate change adaptation.

Infrastructure: Is the "European City" an Adapted Urban Development Strategy?

Multiple overlapping and interwoven trends of spatial transformation in Europe's city regions have been recognized over the past few decades. Current climate change research frequently deals with questions of vulnerability of settlements

caused by the results of climate change, e.g. windstorms, flooding or sea level rise within a global-to-regional perspective. A regional-to-global perspective has to analyse the links between historically grown spatial structures, living and economy in city regions and CO_2 emission intensity as an important part of climate change. A singular regional view examines today's settlement structures as emerging from the simultaneous processes of urban sprawl, re-urbanization, demographic change and economical restructuring with regard to globalization. The focus on ecological impacts has predominantly concentrated on direct land consumption, the induction of traffic and issues of the urban ecology approach, e.g. surface sealing, heat islands and urban aeration affecting both the urban micro- and mesoclimate. To evaluate the ideal of the European city it is necessary to interrelate these perspectives to a widened conception and spatial perspective. This perspective is vital for various reasons: a relevant share of CO_2 emissions can be tracked back to city regions as centres of emission, as city regions are gaining importance as the trend of urbanization continues. At least on the European level, the consequences of global warming will become especially apparent in city regions. Furthermore they possess a well-linked competence for innovation and intervention. Finally, city regions are areas for spreading new lifestyles that could offer opportunities for CO_2 mitigation in the future. "Cities have special responsibilities both to their own citizens and to everyone else to mitigate future climate change" (Hunt et al. 2007: 2615).

Because the success of climate policy is subject to huge delay, research is needed for both short-term effective adaptation strategies as well as long-term effective mitigation strategies. It is therefore necessary to broaden the recent focus on adaptation strategies (Ruth 2006). Exposition, size and interspaces of buildings, configuration of construction materials and surface of buildings and streets have more influence on local increases in temperature than global warming. Even though these microclimate phenomena are well known (Bulkeley and Betsill 2003), the results are hardly considered in urban planning. Instead, strategies of sustainable urban development such as redensification and re-urbanization are still the principles of urban models for European cities (Siebel 2004). Positive climate effects of a compact city have not yet been verified systematically, even though the social constraints of the principle "urbanity by density" has been sufficiently demonstrated (Sieverts 1997). Nevertheless the principle of compact urban development is acknowledged as ecologically sustainable because of its efforts to reduce surface sealing and traffic prevention.

The ecological and social impacts of different models of urban settlement structures (e.g. "patchwork city", "polycentric city", "in-between city", "netcity") and spatial processes (e.g. "urban sprawl", "re-urbanization") regarding their effects for CO_2 emissions is still to be clarified. One main question will be to analyse to what extent the guiding principle of the European city, with its characteristic attributes of centrality, compactness, urbanity, and mixed urban functions that are usually supposed to be sustainable, can be considered CO_2-efficient as well (Bauriedl et al. 2008). Several arguments are constantly referred to in spatial planning, as in adaptation politics, such as:

(a) City regions with settlement axes and interspersed with green are promoting carbon dioxide sinks
(b) City regions with a compact structure and re-urbanization trends are promoting low energy consumption for housing
(c) City regions with a settlement structure of mixed functions and a concentration of high-level functions in the inner city are promoting low-emission mobility patterns

Standardized strategies of mitigation and adaptation are not suitable solutions for urban development. Most adaptation measures on regional climate agendas are taken from the best practice checklists of sustainable urban development (Bauriedl 2007). To cope with the negative impacts of global and regional climate change and to avoid unintended interactions of mitigation and adaptation strategies, scientific knowledge about urban structures and urban living has to be reflected on different assumptions. In addition to searching for spatial structures of city regions that enable climate-friendly urban lifestyles and consumption, the conditions and constraints that influence these structures and the social and global impacts of changing urban lifestyles have to be examined.

Institutions: Multi-Level Governance for Successful Climate Policy Integration

Climate change plays a more prominent role in national governmental programmes than ever before. But at the local level, many large cities, as well as several smaller municipalities, have made climate commitments that are often more ambitious than commitments made at the national level. The decision-making power of many adaptation measures is located with the authorities of regional planning, regional management, regional alliances, enterprises, local affairs and administration, municipalities and the local citizens. Local experience of extreme weather events has made it obvious that climate change mitigation and adaptation are matters of multi-level governance. Yet frequently the efforts of mitigation and adaptation are seen in the context of just one level of governance (PEER 2009: 11). Adaptation at the local level is crucial; for example, water management, agriculture and energy supply are policy areas, which need to be supported by appropriate national and European frameworks, such as funding strategies and adequate legal instruments. Bache and Flinders defined multi-level governance as a concept that "contained both vertical and horizontal dimensions. 'Multi-level' referred to the increasing interdependence of governments operating at different levels, while 'governance' signalled the growing interdependence between governments and non-governmental actors at various territorial levels" (Bach and Flinders 2004: 3).

The multi-level governance of climate change policy is framed by different climate discourses and understandings of adaptation for the global and the local scale. Policy advice from IPCC Reports from 2001 and 2007 are important origins

for this argument. Adger and his colleagues focus on the need to strengthen adaptive capacity to cope with climate change at the local scale of natural resource management and at the international scale of climate change policy (Adger et al. 2003). The adaptation concept became the main argument for coping with the impacts of climate change at the regional level. Local policies – especially in European regions – are shaped by the search for adaptation strategies, which allows continuing common styles of production and consumption. We can see that different definitions of vulnerability and adaptation in global and regional climate change policies exist simultaneously, and these definitions can be relevant at one level and non-relevant at another level of climate change governance.

In the early 1990s, two obstacles were attributed to adaptation: reducing the apparent need for mitigation, and playing down the urgency for action (Schipper and Burton 2009: 7). Approaches in radical geography emphasize the production of scales and their interconnection with the concept of "politics of scale". For a policy analysis on climate change governance it would be useful to transfer this concept to the concept of knowledge production. Radical geography analyses the complex and contested reconfiguration of interscalar regimes. It focuses on the process of allocating politics of scales as a practice of legitimizing policies (Smith 1984). With the notions of "upscaling", "downscaling", and "rescaling", the concept identifies the possibility of shifting policies from one scale to another. In climate change governance we can identify the discursive practice of upscaling responsibilities for mitigation strategies on the one hand, and the discursive practice of downscaling disaster risks (e.g. floods and heat islands) and positive options of climate change (e.g. regional competition for a renewable energy cluster) on the other. Local governments and regional planning authorities in Northern Hesse prefer adaptation strategies that fit into an economic rationality of adaptation with a risk management of costs and benefits. Adaptation strategies that require a reordering of regional governance and a new awareness of environmental accountability have to date been marginalized. This climate change policy is contextualized by the national policy of the German government that supports technological innovations to solve environmental problems. It is based on the dual strategy of increasing efficiency and increased use of renewable energies and regenerative raw materials (PEER 2009: 38).

Governance Innovations: Lessons from Innovative Institutions for Regional Adaptation in Northern Hesse

Policy interdependencies often lead to unclear competencies or responsibilities for government agencies at different levels, often in respect of the problem of budgeting. Reforming such policy interdependencies and improving policy integration is by no means a trivial matter. Multi-level governance offers the opportunity to mandate policy response to the most appropriate level, as expressed by the

subsidiarity principle (PEER 2009: 25). Regions invariably yield a complex mixture of ecosystem goods and services, each with its own set of stakeholders. And they yield a specific formation of adaptation actors and institutions. Figure 1.3 summarizes the horizontal and vertical cooperation and coordination of adaptation governance in Northern Hesse so far. The debate on climate change governance and adaptive capacity in the Northern Hesse region was initiated at the national level by the Federal Ministry of Education and Research with the research programme "Climate Change in Regions" (KLIMZUG). Without this top-down initiative there would not yet be any activities for climate change adaptation governance in the region. The main promoters at the regional level are environmental researchers from Kassel University and the regional management agency of Northern Hesse. The research network has a normative approach to creating an innovative governance formation as a contribution to an increasing adaptive capacity.

The Federal Hessian Ministry of Environment has created an expert centre on climate change in Hesse with the aim to transfer information about regional climate change and to evaluate adaptation strategies at the scale of the state as a whole. One of the most important economic clusters in Northern Hesse is the renewable energy sector, which means that the regional management agency concentrates its promotional activities in this cluster, looking for benefits of regional adaptation strategies. This renewable energy sector has already created transnational networks, and the authority of non-state actors from green energy business within the regional governance formation is very strong. The national government encourages stakeholders within this sector, and several local governments cooperate in creating a regional consumer market for green energy and for re-communalizing the energy supply.

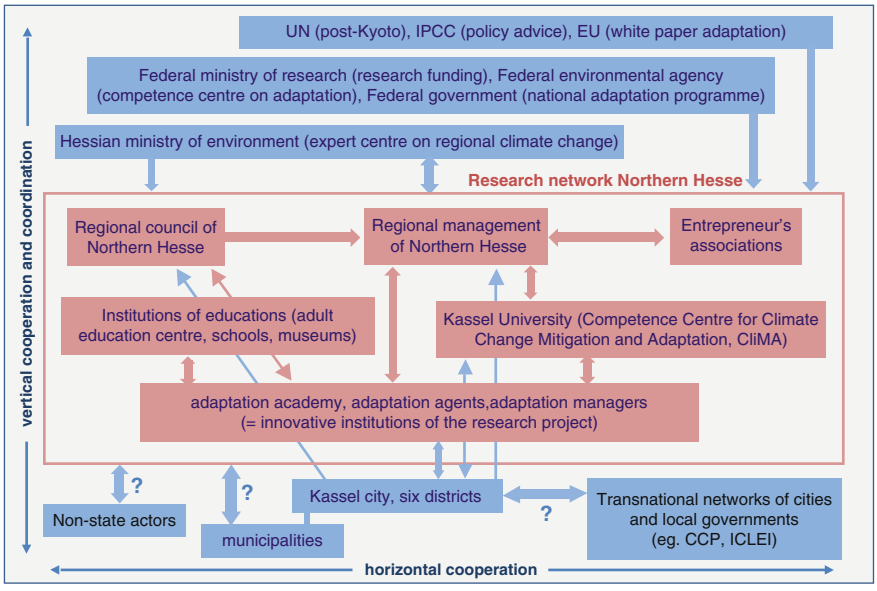

Fig. 1.3 Multi-level governance of adaptation policy in Northern Hesse (Germany)

The research network has initiated three governance innovations. Five colleagues are employed as adaptation agents in the districts' administration with the aim of guaranteeing knowledge transfer between the administration and the scientists. Three colleagues are employed at the regional management agency for the transfer of climate change and adaptation of knowledge to the stakeholders of the different economic sectors. Finally, two colleagues, in cooperation with the adult education centre, are creating an adaptation academy to transfer climate change knowledge to the citizens of Northern Hesse. All three institutional innovations support the development actor networks, they initiate participation processes, and their activities on the path to stabilizing good governance for regional adaptation will be evaluated. The science–policy transfer is one of the main issues of the recent governance debate in the research network. Even the innovative institutions' "adaptation agents" could not avoid conflicts between scientific perspectives and administrative perspectives on climate change governance. One problem is the acceptance of innovative ideas to reorder authorities and to affect traditional power structures. The regional council and the local administrations seek for policy advice from scientists to consolidate their regional authority. The interest in innovative horizontal coordination or processes of policy participation is very low. The vertical cooperation within transnational networks is rather low, too. Until now, Kassel has been neither a member of the network Cities for Climate Protection (CCP), nor are the local government members of the International Association of Local Governments (ICLEI). The objective of our research project at the department of political sciences is to elaborate these conflicts in reforming decision-making processes and to support the development of suitable regional governance.

Conclusions: Integration of Climate Change Policy into Regional Governance Needed

This paper discussed the features and conditions for integrated and more coherent climate policies and governance processes. There is a growing awareness that successful adaptation to climate change will depend on policy integration in other sectoral policies such as policies on water, waste management, energy supply, spatial planning, transport, and infrastructure. For a sustainable (regional) climate policy, an integrative approach to governance is essential. The aims of climate change adaptation and mitigation have to be incorporated into all stages of policy-making in each policy sector, complemented by an attempt to aggregate expected consequences for mitigation and adaptation into an overall evaluation of policy, and a political commitment to minimize contradictions between climate policies and other policies (PEER 2009: 19).

Regional impacts of climate change affect various policy fields and require an integrated risk management. The complex task of adaptation cannot be coped with

using solely hierarchical and state-centred tools. Governance seems to be an appropriate type of government to establish adaptation strategies for sustainable regional development. Which specific actor and institutions have to participate, how should coordination processes be organized and who is responsible for establishing which adaptation strategies? These are questions that have to be answered in a broad regional debate on climate change, like the one that has begun in Northern Hesse. Interdisciplinary research networks on regional climate change have a central position in initiating the necessary communication and networking process.

Innovative governance formations pose a challenge for regional institutions. Even if cooperation between regional management and enterprises exist, as in Northern Hesse, policy processes with the participation of civil society, like "Agenda 21" processes, are very difficult to carry out successfully. To establish adaptation strategies and make them obligatory and sustainable, wide acceptance and legitimacy is essential. Participation processes can generate this acceptance of chosen strategies and legitimacy of the existing institutions.

Furthermore, developing variable steering mechanisms which adapt to altering ecological conditions and socio-economic impacts of regional climate change is a complicated challenge. Regional governance for an increasing adaptive capacity has to follow a permanent recurring process cycle with four main stations:

1. Define the regional situation, identify key stakeholders and develop effective links between the relevant parties in a multi-level setting
2. (Re-)formulate a mission statement on the road to a climate change-adapted region
3. Influence and steer relationships in order to achieve desired outcomes for a climate change-adapted regional development
4. Think and act beyond individual sub-systems, avoid unwanted side effects and establish mechanisms for effective coordination (system management)

Of course, identifying a set of appropriate principles by regional authorities is only the starting point. Institutions can shape policy outcomes but cannot determine them. As Stoker states: "governance means living with uncertainty and designing our institutions in a way that recognizes both the potential and the limitations of human knowledge and understanding" (Stoker 1998: 26). In this sense the regional adaptation to climate change is a permanent learning process for each actor and institution.

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