

Conceptualising Climate Change Governance

Jannes Fröhlich and Jörg Knieling

Abstract The projected impacts of climate change, not only flooding and the urban heat island, but also gradual changes, such as biodiversity loss or a reduction in the groundwater level, can become societal problems. The complex inter-relationships between stakeholders and societal coordination can be included under the term “governance”. The attributes of climate change governance will be outlined in this chapter. Attention is focused on societal scopes for designing and regulating climate change. Firstly, the specific demands for climate change governance are presented. Subsequently, the term governance is introduced, together with its various applications, and the different approaches and concepts regarding climate change governance are discussed. The conceptualisation of climate change governance is based on this spectrum. As this paper discusses, climate change governance is not an entirely new concept, but one that has many parallels with existing models for governance in other settings. Nevertheless, a re-evaluation of its role in this context still appears reasonable since climate change-related measures are characterised by specific features requiring their own regulatory framework. This includes the cooperation of different institutions and actors in addition to hierarchical forms of regulation, and describes the development of self-organising structures. Climate change governance can therefore be described as a broad range of options of coordination concerning climate change adaptation and mitigation.

Keywords Climate change governance · Attributes of climate change · Governance concepts · Spatial planning · Regional planning

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1 Introduction

Public and political interest in climate change has increased in recent years. The fourth assessment report of the Intergovernmental Panel on Climate Change (IPCC) emphasises that severe consequences for humanity and nature in miscellaneous areas are to be anticipated (cf. IPCC 2007). The prevention of greenhouse gas emissions (mitigation) as well as adaptation to the impact of climate change is as significant as each other. The necessity for mitigation, which is widely accepted in society and the management of the impact of climate change, should be treated as an increasingly coequal challenge, since the existing capabilities for adaptation to climate change are unsustainable in the long term. Therefore, action needs to be taken to improve society's resilience to climate change (cf. Adger et al. 2005; Adger and Vincent 2005: 400; Folke et al. 2002: 438).

The possible impacts of climate change may lead to societal problems, especially where homes, industries, harbours or other developed areas are located. The multitude of possible impacts and their effects reveal the number of stakeholders, spheres of activity and interests affected by climate change. As a result, climate change policies require cooperation between different parties, and extend across several policy and sectoral planning areas (cf. Winsvold et al. 2009: 477f). Flooding and coastal protection, urban planning, nature conservation and agriculture—to name just a few important fields—are facing the challenge of developing strategies for coping with the wide-ranging anticipated future impacts of climate change.

The complex inter-relationships between stakeholders and societal coordination processes can be classified under the term “governance” (cf. Benz 2004: 12; regarding climate change, see Dietz 2007: 162). In this process, the role of state, civil society and economy, as well as forms of coordination and regulation, need to be aligned alongside sector-specific perspectives on varied policy areas and corresponding sectors (cf. Benz 2004: 14, 2005: 405; Olsen 2009: 257–258). Therefore, it emerges that governance of climate change incorporates a multitude of structural and regulatory forms across a variety of different stakeholders (cf. Mayntz 2004b; Benz 2005; Heinelt and Kübler 2005; Kooiman 2003).

The attributes of climate change governance will be outlined in this chapter. Which features are characteristic for the approaches and strategies of climate change governance? Attention is focused on societal scopes for the design and regulation of climate change. Firstly, the specific demands for climate change governance will be presented (Sect. 2). Subsequently, the term governance will be analysed across its various applications with a review of the current discussion around different approaches and concepts regarding climate change governance (Sect. 3). This spectrum is the basis for a conceptualisation of climate change governance (Sect. 4).

2 Specific Demands for Climate Change Governance

A profound understanding of climate change as a global environmental and societal challenge is the central requirement of climate change governance. Solutions in the field of mitigation and adaptation to climate change can hardly be successful without an understanding of the structure of the problem. This hints at the prerequisites, namely collaborative and logical actions by participating stakeholders and policy-makers who shape mitigation and adaptation. This context of climate change governance refers not primarily to the natural sciences, but to the socio-scientific dimensions of climate change (cf. Jänicke et al. 2000: 81; Foxon et al. 2008: 3), and will be more clearly outlined in its requirements in the following sections.

Boundary-, level- and sector-comprehensive requirements: Organisational expertise does not usually match climate and geographic units. Therefore, climate change governance needs to shift away from existing norms and adopt an overarching perspective of the contributory factors (cf. Greiving and Fleischhauer 2008: 62; Ritter 2007: 535; Frommer 2009: 129). Moreover, the interaction of different geographical areas and their policy-makers needs to be considered. Important frameworks for initiatives at regional and local levels are being established both globally (e.g., the United Nations Framework Convention on Climate Change) and nationally (mitigation and adaptation programmes and strategies). At the local level, planning and implementation competencies frequently converge. As a result, the coordination and acceptance of mitigation and adaptation are essential. Climate change governance requires a coordinated approach at various levels (cf. Ostrom 2010), in which the typical communication problems between levels need to be tackled. Mitigation and adaptation affect multiple sectors. Mitigation, defined as the prevention of greenhouse gas emissions, is a responsibility for various sectors, especially energy, traffic and agriculture. Adaptation particularly affects health (urban heat island effect), water management and flood protection (precipitation, flooding and storm surges) and urban development (overheating, lack of aeration). Climate change considerations, therefore, do not sit neatly within one specific area of expertise. Comprehensive, coordinated strategic approaches are necessary in order to balance and integrate different claims and to avoid or minimise conflicts of aims.

Diversity of stakeholders: As might be expected with the multi-level, cross-sectoral nature of climate change, multiple stakeholders are involved. A key characteristic of climate change is its multiplicity of different perspectives and interests. This variety implies that there cannot possibly be just *one* adequate form of governance, nor can there be just *one* ideological programme or *one* ideal policy, but rather a broad variety of approaches and solutions. This variety can constrain the options for action, impede consensus and lead to suboptimal outcomes of negotiations (Gupta 2007: 461). However, the discussion about the allocation of responsibilities and duties among governmental, private and civil societal stakeholders in terms of the implementation of mitigation and adaptation

has already begun (e.g. Storbjörk 2007; Lemos and Agarwal 2006: 315). Within this, private households need to contribute as well as local authorities and businesses (cf. Hecht 2009: 162; Ostrom 2010: 27ff). Beyond that, non-governmental organisation (NGO) stakeholders play an important role by communicating with the public and informing policy, for example, through the media or awareness-raising, and can work as advocates of climate change initiatives. Acknowledging this potential, NGOs should be integrated and utilised. Climate mitigation and adaptation calls for new state, economic and civil society structuring.

Longevity: Any broad-based awareness-raising issues regarding the process of climate change are frequently thwarted by the long-term nature of the impact of climate change. Long-term guidance requires intergenerational thinking (cf. Biermann 2007: 330). A time frame of as many as several decades, or even centuries, between emissions and consequences and impacts can exceed existing planning and decision-making periods. This long-term thinking is at odds “with a 4 year electoral cycle, the 2 or 3 year tenure of ministers and senior officials, and the daily or weekly rhythms of everyday politics” (Meadowcroft 2009: 4). In spatial planning, for instance, regional and land use plans have a validity period of 10 to 15 years, while climate projections mostly refer to a timeframe of 50 to 100 years (cf. Ritter 2007: 537; Fleischhauer and Bornefeld 2006: 169). This indicates that established planning instruments and regulatory arrangements do not match the time horizons used for model calculation in climate research. This poses, amongst others, the question of democratic legitimacy in intergenerational policies, in other words, what authority and responsibility do current generations have over future generations (cf. Biermann 2007: 330). To prepare for these long-term consequences, increased efforts in “proactive” mitigation and adaptation, in which climate change is not reacted upon in a reactive, but in an anticipatory manner, are necessary (cf. Kropp and Daschkeit 2008: 356).

Uncertainty: The particular challenge in formulating and implementing mitigation and adaptation strategies and measures is due to its considerable uncertainty. Although there is an understanding of climate change, uncertainties concerning the sensitivity of the climate system, regional climate impacts and the consequences for socio-economic and ecosystems still remain (Meadowcroft 2009: 4). Thus climate research, as well as politics and administrations, frequently refer to this fact. Nonetheless, decision-makers frequently lack knowledge of systematic and intentional decision-making in face of uncertainty (cf. Zebisch et al. 2005: 175). This is due to both the multifaceted options for action and the frequent vagueness of climate projections (cf. Kropp and Daschkeit 2008: 357). This scope of climate projections and the subsequent disparity in scientific climate opinion are in conflict with the logic and formality of decision-making (cf. Fröhlich 2009: 332–345). Consequently, a process-oriented approach that is sufficiently flexible to adapt to modified knowledge and changing framework conditions is required (cf. Biermann 2007: 330). The implementation of a comprehensive concept with definite proposals is no longer the focus. In fact, the aim is to “make a range of subsequent strategic decisions, which offer respectively different solutions” (Ritter 2007: 536).

3 Understanding of Governance

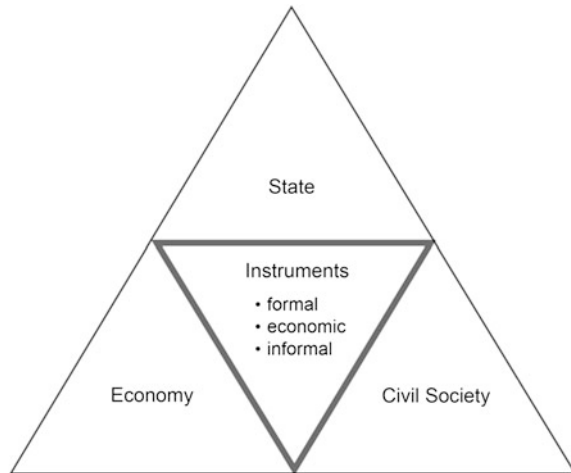
What exactly is meant by the term governance? This question arises because governance is both a “dazzling” (Benz et al. 2007: 10) and an “acknowledged ambiguous term” (Blumenthal 2005: 1149). In many cases, the meaning of governance remains unclear. In a narrower use of the term, governance is the antonym of government and signifies “softer” forms of regulation (see, for example, Pierre 2002) that are not characterised by hierarchical government decisions, but through the inclusion of private stakeholders in problem resolution processes. Governance, in this narrower definition, stands for the blurring of boundaries between state and society (cf. Benz 2004; Bröchler and Blumenthal 2006; Mayntz 2006; Schuppert 2008).

In a wider use, the term governance is not the antonym of government, but a generic term defining the entity of “all co-existing forms of collective regulation of societal circumstances: from institutionalized civil society self-regulation through various forms of cooperation between public and private stakeholders to sovereign action by governmental stakeholders” (Mayntz 2006: 15). In this broad definition, governance is seen as a generic term for the coordination of social actions and not as a distinction from hierarchical regulation or control (cf. Mayntz 2004a; Benz 2005; Heinelt and Kübler 2005; Schuppert 2008).

Based on this broad understanding of governance—from an analytical point of view—the term governance is a perspective on a complex reality (cf. Benz 2004: 12; Benz et al. 2007: 13). This perspective helps to facilitate the survey of multi-layered political and social contexts, as they can be observed in the field of mitigation and adaptation to climate change (cf. Dietz 2007: 162). In addition to this analytical understanding, the concept of governance is also used as a basis for normative statements. This “good” governance refers to societal norms and values, such as the democratic responsibility of governments or the transparency and independence of politics and administration towards interest groups. Governance is frequently used as an applied concept when it comes to governing techniques. These techniques can be derived from normative criteria, but are primarily described in connection with the management of interdependencies, networks and negotiation systems, and less formal decision-making competencies (cf. Benz et al. 2007: 14f).

The term governance refers in many cases to the instruments of an arrangement (cf. Zürn 2008: 556); wherein instruments can be defined as the options available for the realisation of societal aims (cf. Jänicke et al. 2000: 99). The state is not the only stakeholder in the creation, determination and implementation of instruments in governance arrangements, but civil society and/or private actors are involved in the regulation of societal circumstances as well (Fig. 1). Governance, therefore, is connected with a wide range of regulatory and non-regulatory instruments that are being proposed and initiated by non-state actors (cf. Jordan et al. 2007: 285). A basic distinction is made between formal and informal instruments, especially within planning sciences. Classic formal planning tools, such as land use and

Fig. 1 Stakeholders and instruments as dimensions of governance (adapted from Jordan et al. 2007: 285; Zürn 2008: 556)



development plans, are opposed to informal—or “soft”—instruments like regional conferences (cf., for example, Knieling 2003; Danielzyk and Knieling 2011: 466; Priebis 1998: 206, 212). Informal instruments frequently rely on communication (information, participation, cooperation) and are conducive to comprehension and mediation (cf. Selle 2000: 98; Sinning 2003: 56). The range of formal or regulative instruments includes sovereign/legal instruments, such as coordinating and integrating spatial planning, landscape planning and sectoral planning, as well as aims methods and arrangements based on laws, programmes and concepts. Economic instruments, such as taxes and subsidies, are another group of instruments that can be considered competitive (cf. Soltwedel 2005: 627; Braun and Giraud 2009: 178). Unlike formal and informal instruments, there is an additional control effect due to competitive and economic incentives (cf. Stavins 2000: 33; Eising and Lenschow 2007: 332; Braun and Giraud 2009: 165f).

In conclusion, the outlines of the concept of governance emerge on an abstract level. However, due to various aspects of existing knowledge, governance is a fuzzy concept. Within this vagueness lies opportunity, as the term is sufficiently indistinct, allowing it to be used in a variety of disciplines and contexts.

4 Climate Change Governance

There is a multitude of analytical, normative and practical governance approaches in social and planning science literature (e.g., Benz et al. 2007: 13). Connecting factors for climate change are, amongst others, found in the works of Adger (2001); Betsill and Bulkeley (2006); Adger et al. (2009) and van Nieuwaal et al. (2009). Other approaches focus on implementation in consideration of certain levels and territories, such as regional or local governance, or in matters of certain

functions or issues, including environmental governance, earth system governance or risk governance (cf. Jänicke and Jörgens 2009: 156; Biermann 2007: 329; Renn 2008a). All governance and management approaches mentioned here focus on the complex and unpredictable contexts and the change processes of social, ecological and atmospheric systems. In the following, selected governance concepts that can be applied to the challenges of mitigation and adaptation to climate change shall be discussed. For this purpose, the characteristics of climate change governance, as presented in this chapter, will be used as an assessment framework. These characteristics represent normative points of reference along which contours of climate change governance appear.

4.1 Cross-Boundary, Multi-Level and Multi-Sector Requirements

Climate change makes cross-boundary demands on its governance. Approaches, which refer to complex, generally global environmental problems with cross-boundary impacts, have been discussed as *environmental governance* (e.g., Lemos and Agarwal 2006; Jänicke and Jörgens 2009). As an approach for analysis, environmental governance is favoured because of the necessary consideration of the territorial or spatial reach of the examined environmental issues. In practical terms, instruments, processes, mechanisms and organisations can be used as part of environmental governance in order to improve the environmental conditions, in conjunction with public, private and civil society stakeholders (cf. Lemos and Agarwal 2006: 298).

Coastal governance focuses on the coast as a geographical area. In connection with the concept of Integrated Coastal Zone Management (ICZM) (e.g., Kannen 2000; Daschkeit 2007), institutional processes and structures can serve as a basis for planning and decision-making processes in coastal areas or river estuaries. In order to reduce negative environmental impacts, coastal governance is seen as a framework for the coordination of human activities in the coastal zone (cf. Olsen 2009: 263). This applies to both mitigation and adaptation. Coastal governance is based on a cross-sectoral and cross-level, as well as a process-oriented approach, since the problems of coastal zones are being observed integratively and across the borders of certain planning professions. The integrated and process-oriented approach is significant for climate change governance. In addition to sovereign-legal instruments, informal instruments gain relevance when it comes to bringing interests in line within the coastal zone or estuary (cf. Olsen 2009: 259f).

Besides the cross-border impacts of climate change governance, there are also the different forms of regulation on political and administrative (planning) levels (global to local). The concept of *multi-level governance* depicts the fact that “in an institutionally differentiated political system, different levels are interdependent and their decisions need to be coordinated” (Benz 2007: 297 with reference to

Scharpf 2000). The term level usually refers to territorial units, such as communities, regions and federal or national states. The view on climate change and climate policy from the perspective of multi-level governance can highlight the interwoven multi-level processes and structures in the field of conflicts regarding climate change (cf. Brunnengräber 2007: 208; see also Brunnengräber in this book).

Multi-level governance thus includes not only the structure of multi-level organisation, but also the patterns of interaction and coordination systems within and between different levels (cf. Benz 2007: 298). Especially in environmental and climate policy, a mutual dependence between policy levels has emerged through international agreements, such as EU law, which acts at the nation state level and, consequently, at the country, region and municipality level, too. Climate change governance therefore occurs within a complex web of stakeholders, governmental as well as private, operating at different levels and with their mutual influence (cf. Jänicke and Jörgens 2009: 160).

Although climate change affects different levels, the role of local and regional contexts in the successful development of mitigation and adaptation strategies is regarded as highly important (cf. Adger et al. 2007: 728). Local governance arrangements boost the commitment and participation of stakeholders, in particular, in coping with communal tasks and problems (cf. Schwalb and Walk 2007: 7). However, adaptation and mitigation take place in an overlying regional context of geographical, political, economic and social conditions. In addition to the local level, the region, therefore, offers an appropriate complementary level for the implementation of adaptation strategies (e.g., German Bundestag 2008: 4f; RPV 2011).

The approach of *regional governance* focuses on the question of how developmental processes at a regional level can be realised in an increasingly fragmented world (cf. Fürst 2004: 351, Fürst 2007: 354f; Knieling 2006: 72). The region is considered as a link between different levels, sectors and between public and private actors (cf. Schmitz 2005: 965). The term regional governance depicts “complex regional control and coordination structures and incorporates formal and informal elements, governmental and private stakeholders, and hierarchical, competitive and cooperative stakeholder relations” (Benz 2001: 55). Examples of corresponding regional cooperation include inter-municipal cooperation, urban networks, regional Agenda 21 processes, regional development concepts, regional innovation strategies, and so on (cf. Knieling 2006: 72).

Furthermore, multi-sectoral governance approaches are used in the management of cross-sectoral issues. Climate change is meaningful for different policy sectors and sectoral planning. The integration of mitigation and adaptation issues in different sectors and the accordant policies is a central mechanism of climate change governance. It was indicated as early as the 1970 s (under the keyword “cross-sectoral policy”) that there is a demand for the integration of environmental issues into other sectors. In recent years, similar demands have been discussed under the concept of “mainstreaming”, meaning that climate issues have to become integral aspects of sectoral policies (e.g., Swart and Raes, 2007).

Cooperative forms of control can account for this since they improve horizontal policy integration (cf. Jänicke and Jörgens 2009: 169, 171f.). Integration of climate concerns is about the internalisation of responsibilities in the relevant policy sectors. The sectors need not necessarily be the perpetrators of climate change, but, due to their sectoral expertise (e.g., in urban development, energy, water management, agriculture, health) and resources, they are in a position to develop mitigation and adaptation strategies and to both measure and implement them.

4.2 Multi-Agency Setting

Another relevant feature of climate change is the variety of actors and spheres of activity. Governance approaches related to climate change refer to the cooperation of versatile actors. Different approaches, such as earth system governance, environmental governance and participative governance, identify the cooperation of stakeholders in handling environmental issues (cf., for example, Biermann 2007: 328, p. 23; Walk 2008: 14; Jänicke and Jörgens 2009: 169, 171f.).

Earth system governance aims at influencing human-environment relations. The approach identifies suitable forms of regulation in addition to traditional hierarchical state activity. It implies private-public cooperation and new forms of multi-level policy in solving societal problems. Earth system governance “is marked by the participation of a myriad of public and private non-state actors at all levels of decision making.” This actor constellation ranges from “networks of experts, environmentalists and multinational corporations to agencies set up by governments” (Biermann 2007: 329).

Furthermore, the debate around *environmental governance* indicates that environmental problems are identified by social perception and definition. Alongside this, the discourse between science, policy and media is relevant for the perception of the environmental problem (cf. Biermann 2008: 23). In the context of mitigation and adaptation to climate change and demands on governance arrangements, attention is also drawn to the interaction between different groups of actors: “This will require a partnership model of governance combining public, private and civil society into new coordinating arrangements, which will help to address the tension between national strategic frameworks, and local flexibility for delivery” (Nicholson-Cole and O’Riordan 2009: 380). For instance, as pointed out earlier, this partnership is manifested in coalitions of NGOs and media actors campaigning for climate change.

The participation of various civil society groups is particularly being pointed out in *participatory governance* approaches (cf. Walk 2008: 14). The underlying assumption is that participatory governance arrangements improve the quality of policies and their implementation. However, they cannot be a substitute for political decision-making. Furthermore, a necessary outcome is for cooperative forms of regulation to create a sense of higher legitimacy and effectiveness in the decision-making process and results achieved through the involvement of private

stakeholders and the civil society in addition to the public sector. As well as the benefits associated with participatory forms of governance (e.g., transparency, grass-root connections, legitimacy, adequacy to the problem), sceptical questions about the actual effectiveness of different forms of governance and the conditions for success and legitimacy of governance are on the research agenda. It often remains unclear from an empirical perspective how legitimate, imputable and fair different participatory governance forms actually are (cf. Zürn 2008: 577; Offe 2008: 71; Palumbo 2010: xii). Accordingly, it must be identified for the individual case how participation processes can make a contribution and how they can be designed to improve the development and implementation of mitigation and adaptation measures.

4.3 Long-Term Challenges and Uncertainty

Long periods of time pass between the origins of anthropogenic climate change, greenhouse gas emissions and actual changes in the climate and their consequences. Therefore, climate change governance requires cross-generational thinking, which usually surpasses the existing responsibilities and decision periods in policy and planning, and therefore poses a significant challenge (cf. Biermann 2007: 330).

The *earth system governance* approach draws on the aspect of interdependence between generations as the challenges in dealing with environmental change. Due to the long-term nature of climate change, climate change governance is also required to offer a stable planning horizon for several decades, and often generations (cf. Biermann 2007: 330f). However, there lies a tension between requirements for stability and the need for flexibility and ability to take action. The latter are classified as the most important requirements of climate change governance due to its uncertainty. Governance arrangements should therefore be able to react flexibly to new scientific findings and changing stakeholder relationships, and consider these in spite of the long-term nature of climate-related planning (cf. Biermann 2007: 331).

The *risk governance* approach deals with the characteristics of complexity, uncertainty and ambiguity (Renn 2008a, b) which exist with regard to the possible, but not exactly predictable, future impacts of climate change. Uncertainties may complicate decision-making, and this underlines the importance of cooperation and coordination in the public and private sectors. Risk governance aims to make collective decisions about risks, brought about through interactions between science, politics, administration and society (cf. Renn 2008b: 9). Policy-makers and administrators are not the only participants in mitigation and adaptation, but also additional institutions, both public and private, enter into a preferably non-hierarchical discourse in order to be accepted and achieve decisions supported by all parties (cf. Greiving and Fleischhauer 2008: 65).

Further concepts that relate to the adaptive capacity with regard to modified overall conditions are *adaptive governance* (cf. Brunner et al. 2005; Guerin 2007; Nelson et al. 2008) and *adaptive (co-)management* (cf. Jiggins and Röling 2000; Olsson and Folke 2004; Arvai et al. 2006). Central to these concepts are societal, self-organised processes that occur within an overreaching framework of rules and incentives (cf. Olsson and Folke 2004: 87). An important assumption of adaptive management is that the ability to predict future changes in ecological systems is limited. Management practices should therefore be flexible and adaptable, while past experiences and learning processes (cf. Pahl-Wostl 2007: 51) and local context-related knowledge should be taken into account (cf. Nelson et al. 2008: 589f). Adaptive management also aims to strengthen the relationship between science and decision-making in order to facilitate evaluative questions that relate to complex problems with high levels of uncertainty (cf. Arvai et al. 2006: 218).

4.4 Attributes of Climate Change Governance

Climate change governance is not aligned to administrative boundaries; instead it is structured around geographical characteristics. Appropriate regulatory arrangements and instruments are often based on landscapes (e.g., coastal zones, estuaries) and cultural areas. Often they are located on or between different political and administrative levels (e.g., municipalities, regions, nation states and at international level). Climate change governance is also characterised by a multi-sectoral approach.

The integration of climate adaptation and mitigation in different sectors (e.g., energy, urban planning, water management, agriculture, health) takes places in different ways. It can occur through dialogue, financial incentives or coercion. The resulting interaction and coordination requirements between different actors within and between activity levels and disciplines need different forms of regulation and instrument types (Fig. 2). Therefore, one can characterise climate change governance through a regulatory mix, which includes statutory hierarchical forms of regulation as CO₂ emission limits, zoning maps, planning approval procedures or city development contracts contributing to a climate-sensitive form of governing (cf. Fleischhauer and Bornefeld 2006: 161). Economic and competitive forms of regulation are also capable of influencing the behaviour of actors towards climate-friendly development and sustainable orientation. Competition can both mobilise actors through financial incentives and trigger regional dialogue and cooperation. Informal instruments, such as regional competitions, contribute to awareness-raising and the mobilisation of local actors (cf. Buchholz and Riechel 2009: 147f). As a result, competition can be both an informal tool and an economic strategy. In addition to the hybrid form of competition, other informal instruments, such as municipal and regional adaptation and mitigation strategies and programmes, regional conferences, urban and regional development forums and workshops, enhance problem-solving capacity and the quality of implementation of societal

Formal instruments	Economic instruments	Informal instruments
<i>for instance:</i>	<i>for instance:</i>	<i>for instance:</i>
Regional development plans	Land use taxes	Development concepts (local, regional)
Land use plans	Soil sealing charges	Development scenarios
Zoning plans	Water charges	Mission statements (<i>Leitbilder</i>)
Urban planning agreements	Tradeable land use rights	Area management (local, regional)
Plan approval procedures	Certificates	Networks
Environmental impact assessments	Climate standards	Aggregate liability indices
Strategic environmental audits	Incentive systems	Climate proofing
	Climate labels	Climate agencies
		Flood protection associations

Fig. 2 Instruments of climate change governance (own illustration 2010)

mitigation and adaptation processes. They contribute to accounting for different perceptions and the conflicting interpretations of actors. They also contribute towards improving understanding and communication between actors (cf. Sinning, 2003: 56). Exemplary in the field of adaptation are the specific organisational groups, such as flood protection groups or neighbourhood communities in flood-prone areas. They increase the awareness of the affected population in terms of flood prevention, such as structural adjustment, private provision and participation in the planning of flood protection measures (cf. Schaerffer 2009: 263).

A long-term, intergenerational perspective is an essential feature of climate change governance, since periods of 50–100 years and more are taken into account. Today’s generations take precautions for future generations (cf. Biermann 2007: 330f.) and thus have the responsibility for mitigating and adapting to climate change in the future. Therefore, governance structures and planning horizons must be stable, while mitigation and adaptation strategies need to be sufficiently flexible and revisable, because the scope of decisions are subject to considerable uncertainty. Multi-functional land use (e.g., the joint use of green areas for water retention during heavy rain events) can be implemented with the help of determination in formal development plans. But at the same time, they offer the possibility of reacting flexibly and dynamically to changes by providing buffer capacities.

In addition to risk maps, development scenarios and models, which support formal planning processes in this regard, “climate proofing” of development proposals are currently being discussed in order to promote the resilience and adaptive capacity of climate change impacts. As a procedural instrument, climate proofing aims to consider possible future climate changes concerning the development and approval of programmes, plans and projects (cf. Birkmann and Fleischhauer 2009: 123). In doing so, climate proofing fosters an integrated view of climate concerns in development planning.

In summary, climate change governance includes a wide spectrum of steering mechanisms. It includes the cooperation of different institutions and actors in addition to hierarchical forms of regulation, and describes the development of self-organising structures. Climate change governance can therefore be described as a broad range of forms of coordination concerning climate change adaptation and mitigation (cf. Mayntz 2004b; Benz 2005; Heinelt and Kübler 2005; Kooiman 2003; Olsen 2009: 257f).

5 Conclusion

Mitigation and adaptation to climate change are a cross-boundary, multi-level, multi-sectoral and multi-actor challenge with the specific characteristics of longevity and uncertainty. Therefore, many different sectors, strategies, actors and interests are affected. Through the term “governance,” these complex relationships of levels, sectors and stakeholders can be analysed as well as described and conceptualised through normative statements and practical solutions. With regard to the characteristics of climate change, contours of climate change governance can be appointed based on the concepts discussed.

In light of these theoretically obtained derivations, further research might examine the mix of policy and planning instruments for climate change governance based on the example of specific regional and local contexts. It is of particular interest how various forms of regulation interact and what interdependencies may be revealed. In addition, the empirical analysis should explore the different interests and logic behind the actions of affected stakeholders to identify and categorise options for future mitigation and adaptation strategies and measures.

As this chapter shows, climate change governance is not an entirely new concept, but includes many parallels to existing governance approaches referring to other policy fields. Nevertheless, separate consideration still appears reasonable since climate change-related governance approaches are characterised by specific features, requiring a fresh look at regulatory arrangements.

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