

# Climate Adaptation Governance in Cities and Regions

*Theoretical Fundamentals  
and Practical Evidence*

Edited by  
**Jörg Knieling**

**WILEY** Blackwell

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Theoretical Fundamentals and Practical Evidence

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## CHAPTER 1

# Climate adaptation governance in cities and regions: framework conditions, theoretical concepts and research questions

Jörg Knieling and Katharina Klindworth

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For some years now, politicians have been negotiating agreements on cutting down global greenhouse gas emissions and thus limiting global warming to 2°C, and due to the extent and reach of climate change this challenge will certainly keep international diplomacy busy also in the next decades. However, parallel to this we are already experiencing global warming and its impacts. Already today, all over the world vulnerable population groups, settlement structures and land uses are in particular at risk of being seriously harmed. And climate change and its consequences will continue to develop long after global greenhouse gas emissions will have started to decline. Thus, adapting to climate change and its impacts will continue to be necessary even if we are able to reach the most optimistic climate mitigation goals and scenarios. Against this background, it is important to acknowledge that climate change mitigation and adaptation require not only piecemeal approaches and iterative changes but in many ways fundamental transformation of living, producing and working:

*The objective is to put in motion a fundamental transformation in the way we use and produce energy, how we plan our cities, how we manage land and how we prepare for a changing climate and cooperate to minimize its disruptive effect. Transformation takes strategy. You need to know your destination if you are serious about reaching it.*

*(Thorgeirsson, 2015)*

Progressing global warming and urbanization are two of the global processes that will shape the 21st century. They bear the risk of cities and urban agglomerations increasingly experiencing severe climate effects as cities concentrate (vulnerable) population, structures and processes more and more and climate change impacts intensify. However, the density of people, economic activities, organizations and institutions in cities and urban agglomerations also bear potential

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interaction promoting cultural and economic creativity, entrepreneurship and innovation and thus creating and shaping future transformational change.

This book explores the link between governance approaches and adaptation to climate change on the level of cities and regions. Climate change adaptation will be analysed from a perspective of organizing, administering and implementing local and regional adaptation policies using different instruments and forms of coordination. In this regard, the following questions are of interest: How do cities and regions face the challenge of adapting existing and creating new and innovative forms of governance tailored to specific local or regional situations, challenges and needs concerning climate change? How do public actors of local and regional authorities interact and cooperate with different private and societal actors? Which roles do different stakeholders play and how is citizens' engagement in climate adaptation enabled? Which mix of formal and informal instruments, of regulation, cooperation and communication and of organizational change can be identified within various modes of governance at local and regional levels with regard to climate adaptation, and which new arrangements come to the fore?

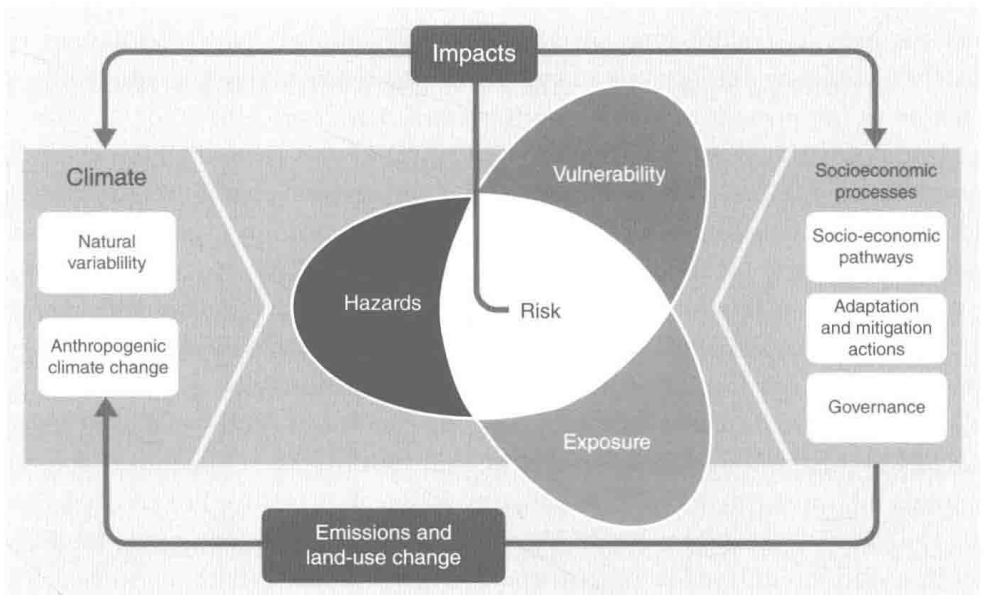
To approach these questions, the book gathers 20 case studies analysing different aspects of climate adaptation governance in cities and regions across the globe. Together they provide a snapshot of current practices of local and regional adaptation governance. Approaching these with different analytical lenses identifies a range of interesting questions for future research and debate.

## **The need for transformational climate change adaptation**

Climate change is a threat to sustainable development (IPCC (Intergovernmental Panel on Climate Change), 2014a: 1106). Global climate change and its impacts with potentially catastrophic consequences (IPCC (Intergovernmental Panel on Climate Change), 2012) are the result of spatially and temporally short-sighted actions and decisions (Nelson, 2010: 497) that have led to unsustainable practices, processes and systems. The spatial patterns of many cities and city regions reflect this lack of sustainability, thus, resulting in urban systems that consume vast amounts of resources and exceed natural regeneration rates while degrading the environment.

There are widespread impacts attributed to global climate change. Physical, biological and human systems are influenced by global warming with occurring extreme events being linked to man-made climate change (IPCC (Intergovernmental Panel on Climate Change), 2014c: 47–53). These include heat waves, increasing frequencies and intensities of heavy rainfall events as well as increasing flood risks due to sea level rise and extreme rainfall and discharges in rivers (IPCC (Intergovernmental Panel on Climate Change), 2014c: 53). Thereby, the

specific impacts of climate change and extreme events depend on non-climatic factors such as exposure and vulnerability (IPCC (Intergovernmental Panel on Climate Change), 2012: 238). Thus, impacts from climate-related extremes such as the disruption of food production and water supply, damages to settlements and infrastructures as well as consequences for human well-being, morbidity and mortality reveal the vulnerability of ecosystems and human systems to climate change (IPCC (Intergovernmental Panel on Climate Change), 2014c: 53). Urban areas exacerbate some of the potentially significant climate impacts due to the concentration of infrastructure and the high density of population. For cities and urban areas, effects of sea level rise, extreme events such as wind storms and storm surges, heat extremes, floods from heavy rainfall events as well as the availability of water and other resources are considered to be the most important effects of climate change (Hunt and Watkiss, 2011: 14–16). The vulnerability of the cities and regions to climate change impacts and other biophysical and societal stressors (IPCC (Intergovernmental Panel on Climate Change), 2014a: 182) are consequences of the long-existing unsustainable societal structures and processes. However, risks not only directly result from climate change and climate change impacts but also from socio-economic processes that influence vulnerability and exposure (see Figure 1.1). Therefore, development pathways, measures for climate mitigation and adaptation as well as governance questions of steering and regulation can alleviate but also increase climate change risks (IPCC (Intergovernmental Panel on Climate Change), 2014a: 26). Thus, developing suitable arrangements of Climate Change Governance (Knieling and Leal Filho, 2013) is a crucial part for managing climate change risks.



**Figure 1.1** Managing risks from climate change impacts (IPCC (Intergovernmental Panel on Climate Change), 2014a: 26).

Against this background, over the last years the international scientific community has recognized that adaptation to the consequences of climate change is a parallel strand of dealing with climate change. Therefore, climate change adaptation does not only require physical measures to protect and adapt settlements and infrastructures to climate impacts but fundamental approaches which – besides political agreements, strategies and measures – include behavioural changes of individuals and, in principle, the re-definition of the society's relationship with the environment (Adger *et al.*, 2009a: xiv). Thus, climate change adaptation is inherently connected with the quest for sustainability (Davoudi *et al.*, 2009: 15).

For understanding adaptation to climate change within a broader societal framework, governance and transition theory offer suitable approaches. In recent years, transition theory has gained broad attention (Geels, 2001, 2005; Grin *et al.*, 2010; Kemp and Loorbach, 2003; Rotmans *et al.*, 2001). It suggests that dealing with persistent problems, which result from a system's unsustainability, such as climate change and the need for climate change adaptation, requires 'fundamental changes in the societal system and its subsystems' (Franziskani *et al.*, 2012: 21), that is transitions. These fundamental changes may result in the transformation of the overall system and the creation of a fundamentally new system configuration (Grin *et al.*, 2010: 11; Park *et al.*, 2011: 3). Thus, the transformation of a system is the result of cumulative effects of various actions of a multitude of actors affecting technology, economy, institutions, behaviour, culture, ecology and paradigms, introducing regime shifts and consequently new regimes (Kates *et al.*, 2012: 7157; Kemp and Loorbach, 2003: 7; Pelling, 2011: 85). Therefore, climate change adaptation is not just a reactive act of reducing and dealing with environmental risks but involves a fundamental societal change to a more sustainable system. Scientific literature suggests that this requires a specific type of transformative change, which enhances the system's 'capacity for desired values to be achieved given perceived or real changes in the present or future environment' (Park *et al.*, 2011: 5).

Transformative change, as defined by IPCC (Intergovernmental Panel on Climate Change) (2014a: 1107), comprises a 'fundamental change in a system, its nature, and/or location that can occur in human institutions, technological and biological systems'. It involves challenging values and norms as well as interests and (power) relations that have led to the current, unsustainable system (O'Brien, 2011: 668ff.; Pelling, 2011: 97). In order to emphasize this, comprehensive approach transformational adaptation is often contrasted with incremental adaptation of small steps reacting to changing conditions (Kates *et al.*, 2012; Park *et al.*, 2011; Rickards and Howden, 2012). Scientific literature suggests that incremental and transformative adaptation and change may be interlinked (Park *et al.*, 2011: 3). However, system attributes required for transformation may be different from those required for incremental change in terms of its ability to deal with complexity and uncertainty (Rickards and Howden, 2012: 246).



Transformation processes that follow the goal of sustainable development are 'deliberate transformations' (O'Brien, 2011: 670ff.), which are purposefully initiated and influenced by a small group of societal actors (O'Brien, 2011: 670). However, transformative climate adaptation is not a process that can be definitely directed in the one or the other direction. Rather, it is the result of purposive, directed measures as well as autonomous, emerging change (Nelson, 2010: 489). Therefore, both collective adaptation, which is explicitly planned, and autonomous adaptations by individuals and organizations are needed to cumulate to transformational change (Kates *et al.*, 2012: 7156). Adaptation has to be oriented towards a long-term perspective with a focus on the opportunities and benefits of adaptation (Rickards and Howden, 2012: 243) instead of only reacting to current changes and avoiding negative impacts. Furthermore, adaptation is understood as a co-evolutionary process of human and natural systems where societal changes occur together with natural changes instead of just as in reaction to these (Rickards and Howden, 2012: 241).

Moreover, innovation and social learning are crucial concepts within transformational adaptation processes (Nelson, 2010: 489). Double- and triple-loop learning, which question and reframe the assumptions and values that underlie society, are seen as basic elements of transition processes (IPCC (Intergovernmental Panel on Climate Change), 2012: 53ff.; Nelson, 2010: 499; Pelling, 2011: 84; Rickards and Howden, 2012: 241), one of the goals of adaptation is cognitive change (Pelling, 2011: 84). Overall, transformational adaptation cannot follow a prescriptive approach. It is understood as a dynamic process that emerges from various individual actions (Nelson, 2010: 489) that might cumulate into system transformation.

## Transformation towards climate-resilient systems

Transformational climate adaptation targets at establishing 'climate resilient development pathways' as development trajectories for future development (IPCC (Intergovernmental Panel on Climate Change), 2014a: 1112). Based on the underlying assumption that sustainability becomes increasingly difficult if not impossible to reach when effective climate change mitigation and adaptation strategies and measures are not in place (IPCC (Intergovernmental Panel on Climate Change), 2014a: 1110; WBGU (German Advisory Council on Global Change), 2011: 62f.), pursuing climate-resilient systems becomes key for sustainable development. Thereby, not only the transformative process of change but also the concept of resilience as envisaged system state involves specific characteristics and challenges for influencing these long-term oriented processes. Scientific literature suggests that transformative climate adaptation is likely to have to overcome different and more challenging barriers than