



Small towns taking different climate change adaptation paths: challenging the dominant leadership paradigm

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Received: 14 March 2025 – Revised: 23 August 2025 – Accepted: 18 October 2025 – Published: 26 November 2025

Abstract. Mainstream discourses on urban climate adaptation leaders have focused on large and medium-sized cities. Drawing from the urban governance literature, we identify four leadership characteristics: (1) structural advantage, (2) high levels of institutionalised climate policy, (3) showcase projects, and (4) visibility of adaptation actions to the outside world (domestic and international). To develop a leadership typology for small towns, we systematically compare these characteristics with climate adaptation efforts in two small towns in Germany. The chosen municipalities developed adaptation approaches within the scope of a third-party-funded project. A mixed-methods design was developed to examine their adaptation activities. Our findings reveal that small towns, despite the lack of structural advantage, were successful in pioneering participatory adaptation action that is anchored in the everyday lives and lived experiences of residents. Some institutional mainstreaming did occur into existing administrative structures, whereas showcasing was not as important. Instead, exchanging knowledge with other small-town peers over challenges and how to develop hands-on solutions were considered more important. In this sense, small towns have proven highly creative in their efforts to implement adaptation action with few formal resources. Small towns take very different paths to tackle climate adaptation locally than mainstream adaptation leaders, who often follow a more institutionalised strategic path of adaptation planning. Given the growing need for mixed adaptation (a combination of planned and self-organized adaptation), small towns could serve as catalysts for initiating this process from the bottom up, anchoring it in everyday adaptation. In the context of imperfect conditions, small towns have the potential to significantly enhance our understanding of what constitutes “leadership”.

1 Climate leadership debates and small towns – a history of non-representation

Some cities take on a special role in political and scholarly discourses as they circulate (good or best-practice) models to respond to challenges such as the sustainable transformation of our economies and societies (e.g. McCann, 2011; Peck and Theodore, 2012). These cities are often labelled as pioneers or leaders for innovative policies (Kern, 2019; Wurzel et al., 2019b). Other cities follow their example to solve societal challenges (WBGU, 2016; Wurzel et al., 2019a). Looking at climate change adaptation (climate adaptation henceforth),

Rotterdam, London, and Cologne are among those cities that regularly appear as pioneers or leaders in climate adaptation (e.g. Hölscher et al., 2019). However, a growing body of literature has emphasised that smaller municipalities are unable to follow the examples of these leading cities (Kern, 2019). Indeed, only very few smaller municipalities are among the best-practice cities of public and scientific debates (Kern, 2019), and they hardly ever appear in climate policy rankings or typologies.

A steadily growing body of literature has explored climate adaptation activities and practices of large and mid-sized cities. This includes qualitative small in-depth case studies on

local responses and strategies (Heinelt and Lamping, 2015; Haupt et al., 2023; Mahlkow and Donner, 2017) as well as quantitative large systematic surveys and analyses of adaptation plans and institutional arrangements (Göpfert et al., 2019b; Otto et al., 2021b; Zölch et al., 2018). In contrast, research on how small cities and especially towns prepare for and deal with climate impacts is still very much in its infancy (Eckersley et al., 2023; Fila et al., 2023; Fünfgeld et al., 2023; Häußler and Haupt 2021; Schanze et al., 2021).

Germany, with more than 10 000 municipalities and strong local self-government (“kommunale Selbstverwaltung”), is no exception. The majority of the countries’ municipalities are small towns (“Kleinstädte”) of 5000 to 20 000 inhabitants (Steinführer et al., 2021); only marginally fewer people live in the totality of German small towns than in the 80 largest German cities that do all have a population of more than 100 000 inhabitants and are also referred to as “Großstädte” (Porsche et al., 2019). Additionally, there are medium-sized towns (“Mittelstädte”) with populations of between 20 000 and 100 000 inhabitants and where around one-fifth of the German population resides. Small towns are residential locations but also account for a large share of Germany’s economic and labour market supply (Milbert and Porsche, 2021). Just like medium-sized and large cities, they must cope with demographic, economic, and technological changes and challenges while at the same time protecting infrastructure and residents from the impacts of a changing climate (Schanze et al., 2021). While urban heat island effects might be less strong in smaller towns compared to densely populated cities, a larger share of their residents might suffer from extreme heat. Many small towns, particularly those located peripherally, are characterised by ageing societies (Teebken, 2024). This shift in the age structure affects local communities’ vulnerability to climate change since older residents show a higher sensitivity to climate impacts such as extreme heat and heavy rainfall (Prina et al. 2024).

We argue that the described lack of scholarly attention cannot exclusively be explained by the fact that small towns might be less accessible for many scholars. In our view, the main issue is that small towns’ climate adaptation activities are less visible than those of larger cities. For one thing, existing adaptation activities and practices might not be labelled and communicated as such, e.g. maintenance of green space or public health policies (Eckersley et al., 2023). However, more importantly, most small towns do not have a formal climate adaptation or heat action plan, and neither do they have dedicated municipal units (e.g. climate coordination departments) or staff (e.g. climate managers or adaptation officers) to tackle adaptation locally (Eckersley et al., 2023). Climate adaptation activities tend to be much more dispersed, fragmented, and less perpetual than in larger cities that have managed to widely institutionalise climate policy (Göpfert et al., 2020; Haupt et al., 2023). Due to a lack of financial and human resources and often unclear administrative competencies (e.g. health management responsibilities during heat

waves), anticipatory and strategic climate adaptation often does not systematically make it onto the political and administrative agenda in small towns (Fünfgeld et al., 2023; Schüle et al., 2016). Schanze et al. (2021) emphasise that budgetary constraints leave little room for financially weak municipalities to address the issue. Moreover, the tasks of administrative staff are comparatively broader in small towns and, increasingly, positions cannot be filled due to a shortage of specialists (Milbert and Porsche, 2021). Thus, administrative capacities for climate adaptation action are often very low in smaller towns. While capacities do not (by any means) equal action or delivering results, they are often their preconditions. Although the Federal Climate Adaptation Act (2023; Bundes-Klimaanpassungsgesetz, KAnG, in German) has established a binding framework for the federal, state, and municipal levels to develop climate adaptation plans, in practice, however, the responsibility remains a sort of voluntary task for many municipalities, unless the states mandate otherwise. Handling such an additional voluntary task can, therefore, be considered rather unrealistic for many small towns. This means that climate adaptation may be tackled only occasionally (if at all) by municipal staff or the town mayor, e.g. on a project level.

Conversely, larger cities often have an extensive repertoire of academic support – sometimes from domestic universities or research institutes – and guidance from planning offices, as well as knowledge and experience exchange in a multitude of networks at their disposal. Additional knowledge stems from active and continuous participation in various city networks (Eckersley et al., 2023; Haupt et al., 2020; Otto et al., 2021b). The situation is very different in small towns, especially in peripherally located eastern German ones. Here, local administrations have so far hardly used these knowledge channels for local adaptation to climate change (Otto et al., 2021b). Moreover, important and expensive climate- and population-related data such as urban maps of central climatological functions, tree populations, socio-spatial processes, and the like can hardly be generated by small towns alone. The same applies to time-consuming and costly vulnerability analyses (e.g. detailed and customised heat or heavy rainfall maps) that are not available to most small towns (Jassin, 2021; Steinführer et al., 2021). Yet, strongly engaged civil societies in smaller towns may provide important alternative resources for innovative local approaches to climate adaptation (Mitchell et al., 2022, 2024). A strong connection to one’s place of residence and a high number of volunteers might provide new opportunities to explicitly address social and ecological problems and provide support to local administrations (Homsy, 2018). These processes are, however, widely understudied since current climate adaptation research is mostly “financed by public authorities embedding an explicitly output-driven application focus in project design” (Schäfer et al., 2024).

Given the described shortcomings, challenges, and lack of academic studies, our exploratory research aims to put cli-

mate adaptation practices of small towns on the map and thereby questions the universality of existing leadership typologies. To do so, we explore climate adaptation activities in two small eastern German towns: Uebigau-Wahrenbrück and Boizenburg/Elbe (henceforth Boizenburg). We selected these municipalities for two main reasons. First, they both show clear ambitions to address climate adaptation locally, e.g. by pioneering smaller local experiments in a real-world laboratory (RwL) setting. Second, they approached the topic in a way that reflects many typical characteristics of smaller towns and can be described as innovative and highly participatory. We critically examine if and to what extent these small towns show characteristics of adaptation leaders.

We draw on urban climate governance literature that has focused on common activities and practices of supposedly successful large and mid-sized cities that are also referred to as climate leaders (Kern, 2019; Wurzel et al., 2019a, b). We systematically compare these activities and practices with the ones of the presented small towns. This helps us to assess whether and to what extent established leadership concepts might be helpful for understanding and theorising small towns' adaptation activities and practices.

2 Climate adaptation activities and practices of leading cities

This section discusses the literature on climate leadership and summarises leading cities' key activities and strategies in tackling climate adaptation. In a nutshell, previous studies have highlighted the fact that climate leaders are usually structurally "advantaged" cities that institutionalise climate policy, develop showcase projects, and put significant effort into gaining (international) visibility. These key activities and strategies are summarised in Table 1 and explained in more detail in the following section.

2.1 Leaders are usually structurally "advantaged" cities

While potentially every city can become a climate leader (Tobin, 2017), some are (much) more likely to do so than others (Wurzel et al., 2019a). The reason for this is that their municipal staff can work under conditions that are particularly favourable for local climate governance (Haupt et al., 2023). To start with, leaders are usually larger cities, in many cases, visible international metropolises (Kern, 2019). A growing body of literature has emphasised how a set of structural conditions, particularly economic, socio-economic, socio-demographic, and political ones, often decisively influence cities' climate policy pathways. To start with, economic preconditions are usually quite good in leading cities, incomes of employees are comparatively high, and unemployment rates are relatively low (Zahran et al., 2008; Krause, 2011; Bedsworth and Hanak, 2013). Leaders are usually growing cities with an above-average formally educated and below-average aged population (Zahran et al., 2008; Krause,

2011; Bedsworth and Hanak, 2013; Haupt and Kern, 2022). Cities with these socio-demographic conditions often have a stronger and more active civil society that pushes for more ambitious climate action (Hoppe et al., 2016; Homsy, 2018; Haupt and Kern, 2022). This can be observed in many university cities, where climate pressure groups such as Fridays for Future or Extinction Rebellion are particularly strong (Buzogány and Scherhauser, 2022; Eckersley et al., 2025). Moreover, physical proximity to universities and research institutions often results in exchanges and collaborations between research and city administration (Bery and Haddad, 2023; Eckersley, 2018; Keeler et al., 2019). Furthermore, these cities can often recruit future climate policy specialists directly from the university to work for the city administration after graduation (Irmisch et al., 2022; Haupt et al., 2023). Lastly, green parties or, more generally, parties or candidates that give higher priority to environmental and climate issues, achieve significantly better election results (Irmisch et al., 2022; Haupt et al., 2023). Lastly, there is often substantial mayoral support for climate action (Bedsworth and Hanak, 2013; Hoppe et al., 2016). In contrast, right-wing populist parties that tend to share climate-sceptic views are usually comparably weak or even not represented at all (Haupt et al., 2023). Yet, differences in climate change opinions manifest through various other contextual factors, such as a divide between urban and rural, prospering and declining regions, and East and West (Mewes et al., 2024). This shows that some of the systematic polarisation is much more fine-grained locally and connected with historical, cultural, and political aspects such as uneven regional development and past environmental legacies (Mewes et al., 2024).

While these listed characteristics heavily influence whether a city manages to become a leader, there are nevertheless a few examples of cities that work under widely unfavourable conditions but manage to substantially put forward local climate action (Wurzel et al., 2019b). Such places are also referred to as unlikely pioneers (Homsy, 2018). We still know little about unlikely climate pioneers and their approaches, but previous research suggests that a general lack of local capacity was often compensated by strong individual actors. Among other things, these actors (municipal staff and climate managers) have succeeded in attracting third-party funds or setting up partnerships with research partners to finance climate action (Haupt and Kern, 2022).

2.2 Leaders institutionalise climate policy

Cities that have been visible as climate (adaptation) leaders and that are referred to as such in the mainstream literature have institutionalised climate policy into their administrative structures and processes. Leaders are typically characterised by high capacities for action (Haupt et al., 2023; Irmisch et al., 2022; Kern, 2019). Thus, these cities usually have created dedicated positions such as climate (adaptation) managers or advisors (Haupt et al., 2023; Wamsler, 2015). They change or

Table 1. Common activities and strategies of leading cities.

Working under favourable conditions	– Often economically strong, large, and internationally visible cities – Higher education levels, younger populations, active civil society – Proximity to universities facilitates public–science collaboration and staff recruitment – Strong green or eco-friendly political representation, weak populist opposition
Institutionalising climate policy	– Creating permanent administrative structures for climate governance – Employing dedicated, permanent staff (e.g. climate managers) – Developing adaptation plans and risk maps (e.g. heat or flood maps) – Adopting heat action plans focused on protecting vulnerable groups
Developing showcase projects	– Implementing pilot or demonstration projects (e.g. green roofs, urban greening) – Integrating climate adaptation with modern urban design – Activities are part of broader urban development and city branding strategies
Gaining visibility	– Actively participating in international city networks – Hosting study tours to showcase policies on site – Competing for awards and recognition (e.g. European Green Capital) – Aiming at inspiring imitation and positioning themselves as climate leaders

introduce new administrative structures, e.g. by establishing or reorganising administrative units (Göpfert et al., 2019a, b; Haupt et al., 2023). This may include a dedicated climate co-ordination unit that is subordinate only to the mayor (Haupt and Kern, 2022; Haupt et al., 2023). Moreover, many leaders have appointed municipal climate advisory committees that typically consist of representatives from politics, city administration, and civil society (Göpfert et al., 2019b). Further aspects of institutionalising climate policy are the development and implementation of dedicated climate adaptation documents. Leaders have usually developed in-depth adaptation plans that include a climate exposition and vulnerability assessment for the city as well as a set of suggested measures and policies (Göpfert et al., 2020; Otto et al., 2021a, b). In-depth analyses of these documents show that leaders are distinguished from other cities by their significantly more ambitious and more comprehensive (written) plans (Heidrich et al., 2013; Otto et al., 2021a, b). Some leaders have also developed context-specific and extensive risk maps, such as climate function maps, urban heat island maps, or heavy rain hazard maps (Haupt and Kern, 2022). As of late, some have also adopted heat action plans that coordinate administrative responses to extreme heat events and mainly focus on aspects of health, particularly the protection of vulnerable groups (Kemen et al., 2020).

2.3 Leaders develop showcase projects

Leading cities often want to be seen as unique places that have managed to pioneer new approaches and that have paved the way for other cities (Wurzel et al., 2019b). To meet these expectations, many leaders have put considerable effort into developing showcase projects (Grove and Freytag, 2019; Jönsson and Holgersen, 2017). Focusing on climate adaptation, examples include green roofs or verti-

cal greening demonstration projects (Beatley, 2016; Cidell, 2017), as well as urban greening and green infrastructure projects (e.g. green belts; Amati and Taylor, 2010). Often, these projects are characterised by a combination of adaptation measures and modern urban design, such as in Milan’s vertical forest skyscraper complex (“Bosco Verticale”; Di Paola, 2021). Previous research has highlighted that such showcase projects are often key elements of leaders’ green city branding strategies (Grove and Freytag, 2019; Jönsson and Holgersen, 2017; Haupt, 2021). In some leading cities, (several) showcase projects are elements of a larger strategic plan as well as of a larger city branding strategy. Examples include the resilience plan of Rotterdam (Spaans and Waterhout, 2017) and Copenhagen’s cloudburst management plan (Haupt, 2021) that help to position both cities as liveable and (climate-) resilient places. Branding strategies that heavily incorporate marketing elements, or in some cases even greenwashing, should be approached with caution, as not all of them may truly serve the primary goal of adapting cities to climate change. More generally, a critical debate on best practice or showcase logics is necessary but at the same time exceeds the scope of our paper. Nevertheless, we find it necessary to emphasise that there are entire literate streams that rightfully discuss the sense (or non-sense) of such practices (see, for example, Andersson, 2016; Nagorny-Koring, 2018).

2.4 Leaders gain visibility

As stated beforehand, leaders aim to attract followers who are inspired by their seemingly innovative policies or showcase projects (Wurzel et al., 2019a). They need to be visible for other cities, and to do so, they apply various strategies and use different platforms. One is to join international networks (Haupt et al., 2020; Kern and Bulkeley, 2009), particularly high-profile networks (Acuto and Ghojeh, 2019; Sancino et

al., 2021). Previous research suggests that visible participation in city networks can help to popularise a city's policies and make its climate efforts more recognisable (Haupt et al., 2020). Another strategy is to invite policymakers from other cities to their cities to study certain policies on site. This is increasingly being done by high-profile leaders through the organisation of so-called study tours (Haupt, 2021; Montero, 2017). Lastly, many leaders enter contests and put great effort into winning renowned awards or prizes such as the European Green Capital Award (Demazière, 2020; Haupt, 2021). All listed strategies are often part of distinct city branding strategies.

3 Case study design, methods and context

3.1 Case selection and methods

As mentioned in the previous section, every city can potentially become a climate governance leader. Nevertheless, the presented common characteristics of typical leaders strongly suggest that climate governance leadership corresponds with the realities that are more likely to be met by big cities (e.g. comparatively young and growing populations, sound economies, strong civil societies, and a strong representation of green and eco-friendly parties). Socio-demographic, socio-economic, and political conditions are often different in small and, especially, in peripheral small towns. However, as highlighted above, there is a need to tackle climate adaptation locally in small towns as well. We focus on two of such small towns and present two governance models of climate adaptation developed in small peripheral eastern German towns.

Our cases, the small town of Boizenburg, located in a rural area of the federal state of Mecklenburg-Western Pomerania, and the small town of Uebigau-Wahrenbrück (Elbe-Elster), located in a rural southeastern part of the federal state of Brandenburg, do not fit the typical climate leader characteristics (see Fig. 1). Both are small towns; Boizenburg has a population of 11 436 and Uebigau-Wahrenbrück a population of 5178 (Wegweiser Kommune, 2021a, b). Both are also rapidly ageing communities. Additionally, Uebigau-Wahrenbrück is a strongly shrinking town located in a structurally weak area. Despite all this, both have pioneered model-like adaptation activities.

Grounded in critical social science research, our field study followed a mixed-methods design to empirically examine the adaptation activities in Boizenburg and Uebigau-Wahrenbrück. The data include two separate qualitative interview surveys, public documents, and field notes from incoming participation (“*zugehende Beteiligung*”). The first survey was conducted in spring 2019 and included a total of 27 interviews with residents of Boizenburg and the Elbe-Elster region. These problem-centred interviews focused on local vulnerability and resilience constructions, and on how residents more broadly perceive climate vulnerability and

adaptation. The interviews aimed at collecting different perceptions related to increasing climate change impacts, the extent to which climate change is a topic of local concern, and what adaptation efforts are already being undertaken by the local community. The interviewees were not interviewed as representative of social actors but to gain insights on the different experiences with and perspectives on climate change (adaptation). The interview findings critically informed the real-world laboratory activities of both case study regions.

In spring 2021, we conducted another 12 qualitative problem-centred interviews with residents of both towns. This time, the interviewees were selected based on their ties to different parts of the municipal community and their potential overview of broader changes in the city. This survey aimed at generating insights on people's visions of the future, the nature of ongoing climate adaptation activities, whether people felt engaged or excluded from adaptation activities, and if these activities adequately addressed local concerns. This survey also provided insights on how and why people choose to participate and the role citizen engagement plays in creating a liveable future. Interviewees provided insights from different sectors and areas, such as local civil society, the social sector, politics, political administration, and the economy. The interview length was usually between 1 and 1.5 h. We conducted both interview surveys in the German language and voice-recorded, transcribed, and analysed them thematically using the software MAXQDA. For both surveys, and due to the exploratory nature of the research aims, for which little secondary literature was available at the time, the data were coded inductively. For the first survey, two researchers analysed vulnerability and resilience constructions thematically, exploring similarities and differences in local perceptions and practices of citizens related to climate change adaptation. For the second survey, two researchers again engaged in open coding (independently of each other) to identify core themes and patterns regarding the nature of adaptation activities, the role of citizens within them, and citizens' critical assessment of these activities. To examine the development of adaptation practices over time, we also conducted two in-depth qualitative interviews with the climate adaptation coordinators in Boizenburg and Uebigau-Wahrenbrück in the summer of 2022. Interview questions focused on local characteristics and preconditions that impact common perceptions and visions of the future and adaptation processes. Moreover, the interviewees were asked about the outcomes, impacts, and local developments that occurred as a result of the platforms.

Further, we collected publicly available documents on climate adaptation activities in Boizenburg and Uebigau-Wahrenbrück. Some of these documents were created in the context of project activities, such as a climate mitigation plan, municipal websites, and over 50 local press articles on climate adaptation activities in both municipalities. Additionally, publicly available documents not necessarily connected to project activities (e.g. strategic reports) were con-



Figure 1. Location of Boizenburg/Elbe and Uebigau-Wahrenbrück in Germany.

sulted. Although a systematic content analysis of these documents was not carried out, they were examined to capture local activities and conditions for climate adaptation and relate them to the interview findings as well as the overall perception of climate adaptation and the activities that took place locally. We employed a theme analysis, which builds upon the description of leader agency (see Sect. 2). The theme analysis allowed us to identify and analyse recurring themes or patterns related to the agency demonstrated by leaders.

In addition to the interviews and document analysis, field notes were collected throughout the project duration (2016–2024). These notes were part of the project’s “incoming participation” approach. Incoming participation is a low-threshold method that aims to bridge science and society. It fosters dialogue across boundaries by using flexible and active participation formats linked to local events. In this way, the formats are embedded in local cultural spaces. This approach is not only a key methodological pillar of the project but also helps to connect adaptation activities to culturally established events. It is especially useful for municipalities and actors with limited formal capacities, as it allows them to meet citizens and local actors where they already are.

3.2 Case description: real-world laboratories (RwLs) in Boizenburg and Uebigau-Wahrenbrück

Both towns have developed their adaptation approaches within the scope of a third-party-funded project (2016–2024). The project’s main goal was to increase the resilience of small towns and their residents to the impacts of climate change. When the project started in 2016, most small and medium-sized German municipalities had hardly been concerned with strategic adaptation policymaking. There was and, in many ways, still is very low administrative capacity for strategic climate adaptation and the implementation of measures in most small German towns (Bausch and Koziol, 2020; Fünfgeld et al., 2023; Fila et al., 2023). The project aimed to address these shortcomings in an RwL setting (see Renn, 2018; Schöpke et al., 2018) that foregrounds a small town’s needs and preconditions right from the beginning. The project team, at the time consisting of the researchers and a communication agency, looked for potential partner towns that had to meet specific criteria such as a specific population size (< 20 000 inhabitants), being peripheral in terms of geographical location and administrative consensus (the administration being willing to join the project), and demonstrating openness for innovative local experiments. In May 2016, the project team approached more than 15 small towns with the offer to develop the project together in an RwL setting. Due to a lack of administrative capacities of the enquired towns, only Boizenburg, Uebigau-Wahrenbrück, and Bad Liebenwerda displayed significant interest in joining the project. Despite facing challenges very common for small towns, both showed an openness to join this project that advanced the research and development of the recent topic of climate adaptation. This can be considered a first argument for their singled-out role as leading municipalities. From 2018 up until 2024, the project offered them the opportunity to receive national funding for a full-time project coordinator position and support from the researchers, as well as communication and participation experts.

Over the course of the project, the researchers were involved to varying degrees in the real-world laboratory activities of Boizenburg and Uebigau-Wahrenbrück. At the beginning of the project, researchers were more present on site and actively involved in setting up the RwL with the local project coordinators. With the onset of the coronavirus pandemic, this was no longer possible, and a division of labour was established whereby the municipal partners raised issues they wanted to address within the RwL setting, and the project team joined online to discuss possible ways and means of helping the municipalities to find solutions on their own. The project coordinators then went on to develop local activities with the citizens and local stakeholders in their respective towns. The scientific partners were able to take on an observational role in this process and were, in most cases, no longer involved in the development of local adaptation activities in later phases of the project. The results presented here

are therefore largely based on the conducted interviews that took on a second-order perspective of the local adaptation processes. Nevertheless, the researchers' own involvement in the project gave them access to the interview partners and to additional documents for contextualising the results (e.g. strategy documents etc.).

The researchers deliberately chose a low-key involvement in the RwL activities in order to determine the extent to which climate adaptation can be implemented collectively, building on social practices and existing capacities in the examined cases. It was always considered possible by the project team that the whole process could collapse and fail; however, it was the aim that the collaborative approach to climate adaptation would work independently from the third-party funding and reflect small town practices and capacities. In this respect, the individual activities of Boizenburg and Uebigau-Wahrenbrück may be unique; however, the process of collaborative climate adaptation has generalisable and transferable aspects.

Boizenburg is located in the UNESCO biosphere reserve "Flusslandschaft-Elbe" and has been increasingly affected by climate change impacts. Even though the last major flooding event of the river Elbe occurred in 2013, Boizenburg has frequently been affected by minor floods (NDR, 2025). Also, droughts and heat waves have hit the town in the past few years. Despite Boizenburg being a small town with a high green space ratio, the urban climate analysis of 2021 revealed a significant area of bioclimatic stress in the urban centre, affecting especially the heat load of the old town and commercial areas compared to adjacent green spaces (City Boizenburg/Elbe, n.d.). It is not surprising that Boizenburg is recurrently among the hottest towns in Mecklenburg-Vorpommern and hit a record high of 39.4 °C in 2022 (NDRMV, 2025).

The increase in average temperature has resulted in disruption across various areas (e.g. an increase in invasive species and vector-borne diseases). Amongst other things, climate projections show a further increase in temperature (between 0.4 and 3 °C), summer days, and tropical nights across all emission reduction scenarios (Pfeifer et al., 2021). Interviewed officials described the key challenges of Boizenburg as low administrative capacities, a skilled-labour shortage, and a lack of digitalisation. Maintaining social cohesion and integrating newcomers to the town are tasks that are strongly connected with the challenge of town core revitalisation. Town officials, such as the mayor and the head of the building department, saw the project as an added value for the municipal administration as it had the intention of systematically and strategically taking up the topic of climate change and citizen engagement at the same time.

Uebigau-Wahrenbrück is located in the Elbe-Elster region. It is part of the Liebenwerda Association Municipality, a new administrative unit formed in 2020. The Elbe-Elster region is strongly affected by structural and demographic changes as well as annually recurring climatic extreme events such as drought, heat, storms, heavy rain, floods, and wildfires.

Forest fires and heavy storms have been significant areas of concern. The state of Brandenburg is leading federal forest fire statistics: in 2018, 2019, and 2022 the number of forest fires reached the highest levels since 2003 (BMEL 2022, MIK 2023). In 2022 alone, Brandenburg experienced more than 500 forest fires (MLEUV, 2023). Additionally, storms in the region have been observed to become stronger and more frequent in recent years. For instance, Hurricane Niklas (2015), Hurricane Frederike (2018), and Hurricane Sabine (2020) have led to civilian casualties and extreme damages to property, buildings, and critical infrastructure (Blaulichtreport Elbe-Elster, 2017). Initially, Uebigau-Wahrenbrück and Bad Liebenwerda intended to realise the project in a joint partnership. Due to the administrative and financial burden caused by the administrative restructuring process, this could eventually not be realised. Instead, administrative units that had previously handled climate policy were dissolved. As a consequence, competencies and experiences gained in energy transition ("Energiewende"), climate change mitigation, and adaptation that had been built up over many years were in danger of being lost. Thus, the project was carried out by a non-profit civil society organisation supported by the municipality of Uebigau-Wahrenbrück. During the project, a new organisational structure evolved based on the local prerequisites. In the course of the project, both towns developed two distinct approaches to tackle climate adaptation. These approaches responded to their respective most pressing local challenges. In the following subsection, we describe these two approaches and systematically compare them to the common activities of climate leaders (as shown in the existing literature).

4 Climate adaptation activities and practices of ambitious small towns

In this section, we focus on the empirical findings of our fieldwork in the two case study towns. We structured our findings according to the common activities and strategies of typical leading cities and systematically compared these to the activities and strategies we examined in Boizenburg and Uebigau-Wahrenbrück.

4.1 Institutionalising climate policy?

According to the climate leadership literature, progressive cities have widely institutionalised climate policy into their administrative structures and processes. Criteria for institutionalisation are the development and formal adoption of adaptation plans (Otto et al., 2021a, b), the creation of dedicated administrative positions (Wamsler, 2015; Haupt et al., 2023), the establishment of administrative climate units (Göpfert et al., 2019a, b; Haupt et al., 2023), or the appointment of climate advisory committees (Göpfert et al., 2019b). To do so, political support and commitment but also the necessary financial means are considered crucial.

In our case studies, the institutionalisation of climate adaptation proved to be very different from what we know from bigger cities and climate leaders. As part of their involvement in the project, both towns agreed to develop inclusive, co-creative, and participatory adaptation processes rather than top-down planning processes. Initially, they sought to achieve this aim by initiating a participatory visioning process implemented through a set of different local experiments. After several workshops with the residents in both R_wLs, this very ambitious and demanding approach was abandoned for a small-scale and hands-on procedure. Nevertheless, the take on local adaptation remained the same. The two R_wLs put high emphasis on the residents' preferred topics, favourite places, and narratives. They were used as starting points and helped to explore linkages to local adaptation.

Collaborative activities were coordinated through “governance platforms” for climate adaptation. These platforms institutionalised climate adaptation in both towns by applying a network governance approach. The two platforms, PLATZ-B in Boizenburg and Leuchtturm LOUISE in Uebigau-Wahrenbrück, worked as initiators and anchors for different local and regional networks that evolved around bottom-up adaptation projects. They provided multiple supports to realise projects, often bridging the citizen-based ideas and administrative requirements.

In both case studies, the platform approach led to the institutionalisation of climate adaptation. Since the creation of a permanent climate (adaptation) manager exceeded the administrative and financial capacity in both towns, there were extended efforts to integrate adaptation policies into existing administrative processes. This integration was strongly supported by the creation of temporarily funded coordinator positions (platform coordinators for PLATZ-B and Leuchtturm LOUISE) that served as an interface between administration, civil society, and further local stakeholders.

Initially, the institutional integration of climate adaptation through the development and implementation of a distinct adaptation plan was beyond the scope of small towns like Boizenburg and Uebigau-Wahrenbrück. Indeed, even many larger towns and cities in Germany do not have such a distinct adaptation plan, although almost all have a mitigation plan (Otto et al., 2021b). Nevertheless, as part of their involvement in the project, both towns tried to include climate adaptation in existing plans. In Uebigau-Wahrenbrück, this has been done by linking the topic of adaptation to topics of the already existing “integrated urban development concept” (INSEK). In Boizenburg, the platform coordinator integrated the topic into municipal policy by initiating the adoption of a principle resolution on climate and environment protection and by the acquisition of funding for a climate mitigation manager. Thus, it was the climate mitigation plan that provided linkages for the integration of climate adaptation.

Our two case studies revealed quick reactions to windows of opportunity and a strong preference for visible results over lengthy strategy development and planning processes.

While strategic (planned) adaptation and self-organised (everyday) adaptation are often perceived as the opposite of each other, both types are crucial for increasing resilience, with their interplay becoming more important (Maskell et al., 2025). Strategic plans might be larger in scope and scale with greater institutional support (Maskell et al., 2025), but consistent and participatory R_wL activities with quick visibility enabled a strong integration of climate adaptation into the daily lives of the residents. The function of the governance platforms in that process was to coordinate activities initiated by the residents and to support the implementation of those adaptation activities. Examples include an orchard meadow and tree planting activities. Rapid project implementation – at least compared to strategic plans – can create a sense of self-efficacy and might even strengthen a sense of belonging in the community (e.g. Mittermüller, 2020). Focusing on the necessity of visible impacts and fast success stories to keep the interest in the topic alive and the co-creative climate adaptation activities ongoing, an interviewee from Uebigau-Wahrenbrück summarised the approach as follows:

“Well, I would say that is part of the process; a constant drop wears away the stone. This is an activity that is also plausible, it conveys things even to the very young users. (...) People want to see ways of how to make a change, and then it will be done. It doesn't pass by without a trace.” (I-1 EE, 2020)

The attempt to establish climate advisory boards, increasingly common in larger cities, failed in both towns. However, the coordinators in both towns put great effort into building supportive networks comprising local and regional actors to help to realise adaptation activities. In Boizenburg, the extended network of supporters built up by the governance platform helped to expand local climate knowledge. Boizenburg became part of a research project that provided the town with a precipitation analysis by the Climate Service Centre Germany (GERICS). Students of the Eberswalde University for Sustainable Development supported residents in their efforts to make Boizenburg's municipal park climate proof. As part of their student project, they mapped and discussed possible climate adaptation projects in the park with residents and presented their results to politicians and selected administrative staff. The coordinating platform had a crucial role in this, mainly through forging project-specific alliances while also providing credibility in expertise. Or, as the coordinator of PLATZ-B highlighted:

“So, what really worked with PLATZ-B as a platform concept was the transparent information on the topic. The perception from politicians or residents was not independent but trustworthy, filled with expert knowledge. So, there was this trust and the knowledge that ‘here, you can get informed, and this information is not biased or filtered’.” (I-11, 2022)



Figure 2. Participatory mapathon “Together Search Days” kick-off event to explore favourite places in Boizenburg. Photo: PLATZ-B, Beatrice John.

4.2 Pioneering showcase projects?

Many leading cities have developed showcase projects such as green roof projects, vertical greening projects (Beatley, 2016; Cidell, 2017), or green infrastructure projects (Amati and Taylor, 2010). What these projects usually have in common is the focus on (changes on) the built environment. Showcase projects of such size usually require advanced planning capacities and/or a significant amount of funding readily available in municipalities. In both towns, this was not the case at the time of the project and would have exceeded the scope of the studied RwLs.

Again, as for institutional integration, bottom-up participatory approaches were central to Boizenburg’s and Uebigau-Wahrenbrück’s take on climate adaptation. Both towns tried to tackle adaptation by initiating collaborative practices that used residents’ daily lives and routines as starting points. This resulted in a set of small but visible projects and landmark projects that were kicked off shortly after the start of the RwLs. In Boizenburg, for example, various walks were organised cooperatively by residents as part of a summer festival to discover climate-relevant places or paths in the town and to exchange ideas about climate adaptation (see Figs. 1–3). Places associated with well-being, for example shady places in summer and the ice cream shop, were identified by the residents and marked on a publicly accessible map. This not only led to a lively exchange about town development, but the residents also collected data that Boizenburg’s administration would hardly have been able to gather alone. The residents who collected and entered places on the online map during the walks stayed in contact and formed civil society networks that jointly developed long-term adaptation projects. One of these networks is a group of watering sponsors who look after the trees marked on the map. An-



Figure 3. Stand-up paddle expedition to explore favourite places in Boizenburg. Photo: PLATZ-B, Beatrice John.



Figure 4. Expedition barrier-free Boizenburg: barriers in the old town and on the ramparts. Photo: PLATZ-B, Beatrice John.

other network established after one of these walks is dedicated to adapting the abandoned city park to a changing climate and trying to raise its biodiversity.

The combination of the walks and the digital mapping led to snowballing effects and initiated further local adaptation activities. However, even though citizen-based activities are rather small scale, the online map allows relatively wide publicity and provides a sense of self-commitment. The approach has raised interest in other small municipalities that are keen to replicate this.

Another example of iterative adaptation activities are the citizen-based initiatives that evolved around the renaturing of the river Schwarze Elster in Uebigau-Wahrenbrück (see Figs. 4 and 5). Even though the scopes and adaptation effects of most of the citizen-initiated projects were limited, both



Figure 5. Residents discussing the planned renaturation of the river Schwarze Elster. Photo: Leuchtturm Louise/Andreas Claus.

towns put considerable emphasis on increasing their visibility in the networks of neighbouring towns and in their region. This was done by reaching out to the local press as well as the intensive use of social media (i.e. Instagram and Twitter blogs). The main aim was to initiate snowball effects in the local community. Since the realised climate adaptation experiments were down-to-earth and close to people's everyday lives, and since they were the results of collaborative efforts, they have also set examples for further activities. In this context, one interviewee remarked:

“But if there's an incentive that afterward there's something beautiful (...) where many people pass by and say ‘Cool, it looks nice, we haven't seen this here before because nothing beautiful is usually done here’, that was the first time I thought maybe we have to approach the issue from a completely different angle. Instead of going there and saying ‘You can't do this anymore, and you must do this now, and this is prohibited’, it's more like ‘Look, together we're creating something cool, something that benefits us all, where we can create beautiful places, something that is sustainable and not so massive that it becomes an insurmountable mountain’.” (I-7 BB)

4.3 Gaining visibility?

Leaders typically aim to attract followers. To do so, they need to gain visibility, e.g. by joining (international) networks (Haupt et al., 2020; Kern and Bulkeley, 2009). More ambitious and larger German municipalities have joined international climate networks such as Local Governments for Sustainability (ICLEI), the Covenant of Mayors, or the C40 Cities Climate Leadership Group. Many other cities, also those with only moderate ambitions, would join the Klima-Bündnis (Climate Alliance), an international network that has a strong membership base in German-speaking countries (Otto et al., 2021b). However, both towns did not join any



Figure 6. Planting campaign along the river Schwarze Elster. Photo: Leuchtturm Louise/Andreas Claus.

of these established climate networks. Instead, both created informal networks of necessary actors to bring their adaptation goals forward. Their network activities were less about advertising or even upscaling their projects and approaches to other municipalities and more about accessing potential funding channels for their climate adaptation activities in their region.

“And that these are really the approaches, that you start talking in the region, you actually know each other, you also know the local problems, and therefore you need to communicate and try to get talking to each other, because there are really important approaches.” (I-3-EE)

To gain or increase visibility, many leaders try to win climate awards or prizes, preferably those that help to build up an international reputation, such as the European Green Capital Award (Demazière, 2020; Otto et al., 2021b). While international awards are way beyond the scope of Boizenburg and Uebigau-Wahrenbrück, both have been successful at a national scale. As an example, the Leuchtturm LOUISE civil society platform approach in Uebigau-Wahrenbrück won Blauer Kompass, a highly competitive national award managed by the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (Bundesumweltministerium, BMUV) and the German Environment Agency (Umweltbundesamt, UBA). Over 13 000 public votes were collected for the Leuchtturm LOUISE civil society platform approach (see Fig. 6). This mobilisation of votes also illustrates the support that the project had in the region. Receiving this award as a smaller municipality should not be underestimated, given that national awards are often dominated by the usual suspects: larger and also internationally visible cities (Otto et al., 2021b). Furthermore, the PLATZ-B administrative platform from Boizenburg made it



Figure 7. Bus touring by residents to mobilise votes for winning the federal competition “Blauer Kompass”. Photo: Leuchtturm Louise/Andreas Claus.

onto the best-practice database of the recently established national centre for climate adaptation (Zentrum KlimaAnpassung, ZKA). This means that PLATZ-B is among one of only three best-practice examples developed in small towns (as of October 2023), while a large part of the practice database includes practical examples from large and medium-sized cities (27 examples) as well as regional associations and counties (five examples).

5 Climate adaptation activities and practices of ambitious small towns: discussion and concluding remarks

We have explored climate adaptation approaches of the two small German towns Boizenburg and Uebigau-Wahrenbrück. While highly visible and institutionalised adaptation still mainly appears to be a bigger cities’ business, both places have shown unusual ambitions for small towns and did pioneering work in participatory local adaptation in an RwL setting. Given that different adaptation types are crucial for building resilience (Maskell et al., 2025), formally planned adaptation should not be overestimated, and the potential of self-organised responses that draw from the lived experiences of residents should not be underestimated. The latter can indeed drive and/or inform planned adaptation, enabling a mixed adaptation type that can ultimately lead to more effective adaptation pathways (Maskell et al., 2025). Examples from small towns may also be viewed as a starting point to initiate this process and as leading examples for complementary adaptation action.

Our findings reveal that ambitious small towns take very different paths to tackle climate adaptation locally than ambitious larger leading cities do (see Table 2 for an overview). While leading cities usually have institutionalised and for-

malised adaptation policies, smaller towns lack comparable administrative capacities and long-term planning perspectives. However, this does not necessarily mean they do not have strategies to institutionalise climate adaptation policies. Both have put significant effort into integrating activities into already existing administrative processes (including plans) and have also widened their scope beyond typical administrative activities. In that regard, our results demonstrate that the coordinating unit to complete this task can be placed within an administration, as in the RwL PLATZ-B in Boizenburg, or work outside of administrative structures, as in the RwL Leuchtturm LOUISE in Uebigau-Wahrenbrück.

Moreover, mainstream adaptation leaders have often developed larger showcase projects that mainly focus on the built environment and often require advanced planning and engineering capacities (Jönsson and Holgersen, 2017). In contrast, Boizenburg and Uebigau-Wahrenbrück tried to increase the visibility of their adaptation activities through small-scale, quick, and highly visible projects that were developed and carried out in co-creation between municipal administration, civil society, and further interested local actors. Their efforts were well anchored in the everyday lives and lived experiences of the residents. Other than mainstream city leaders, our case study towns did not join national or international networks. Instead, they focused their activities on building their own regional and municipal networks to promote their projects as well as passing on knowledge. Such networks were created or joined to learn from each other in terms of exchanging knowledge on how to overcome local difficulties, what hands-on approaches are available, and how to gain access to funding and not simply showcase successful adaptation work to other municipalities. In that sense, small towns have proven highly creative in their efforts of successfully implementing adaptation action with few formal resources.

Despite lacking the capacities usually ascribed to climate city leaders, some “leader-like” behaviour could be observed in Boizenburg and in Uebigau-Wahrenbrück as well. Examples are the inclusion of a local project into a good-practice database of a nationwide climate adaptation agency (Boizenburg) and the efforts to win a competitive national climate adaptation award (Uebigau-Wahrenbrück). Indeed, gaining visibility and attracting followers are key motivations of climate leaders (see Kern, 2019; Wurzel et al., 2019a).

Although Boizenburg and Uebigau-Wahrenbrück do not qualify as climate leaders as understood in the literature (Kern, 2019; Wurzel et al., 2019a), both might have nevertheless developed models that other small towns could follow – models mainly because they consider the specific realities and conditions of smaller towns. In many peripheral small towns in Germany, there were and, in many ways, still are very low administrative capacities for climate adaptation policy (Bausch and Koziol, 2020; Fila et al., 2023; Fünfgeld et al., 2023). Participatory approaches that focus on creating and maintaining links between municipal administration and

Table 2. Common activities and strategies of larger leading cities compared to the activities observed in ambitious small towns.

Larger leading cities	Ambitious small towns
Institutionalising climate policy – Creating permanent administrative structures for climate governance – Employing dedicated, permanent staff – Developing adaptation plans and risk maps – Adopting heat action plans focused on protecting vulnerable groups	Approaching climate policy incrementally – Building climate governance on existing roles and personal commitment – Maintaining limited formalisation, with responsibilities embedded in broader duties – Relying on temporary funding and project-based positions – Less frequent use of formal risk or adaptation planning tools
Developing showcase projects – Implementing pilot or demonstration projects – Integrating climate adaptation with modern urban design – Activities are part of broader urban development and city branding strategies	Focusing on pragmatic solutions – Implementing small-scale and low-cost projects – Focusing on tangible local problems – Framing projects as practical solutions rather than visionary experiments – Use of pilots is less embedded in strategic development
Gaining visibility – Actively participating in international city networks – Hosting study tours to showcase policies on site – Competing for awards and recognition – Aiming at inspiring imitation and positioning themselves as climate leaders	Seeking selective recognition – Engaging in regional or national networks – Aiming to be a model for other municipalities in the region and the country but with limited international visibility – Selectively seeking recognition to gain legitimacy and attract funding – Visibility is often pursued to support internal advocacy or inter-municipal cooperation

civil society and thus aim to establish adaptation as a shared task might be a promising alternative approach, especially for smaller towns with a lack of political will and limited financial and human resources. This is where small towns might as well be considered leaders in the pursuit of mixed adaptation responses that are grounded in everyday adaptation.

Certainly, such approaches are not without their downsides. First, the lack of permanent funding and reliance on external and project-based funds put the long-term coordination of the activities into question. And second, civil societies concerned with environmental and climate issues are usually far less active and considerably weaker in smaller towns compared to (university) cities (Haupt and Kern 2022; Hoppe et al., 2016; Homsy, 2018). However, as the example of Boizenburg shows, self-organised participatory adaptation may be a starting point for the development of a formal adaptation plan. The first issue will remain a permanent challenge and can probably only be addressed by the continuous acquisition of third-party funds, which again ties up scarce municipal human resources (e.g. writing grants, documenting the use of money to the funding bodies). The second issue, however, can be addressed by the proactive mobilisation and inclusion of residents as done by Boizenburg and Uebigau-Wahrenbrück. Third, as the topic of climate adaptation is receiving more attention, also in light of the most recent federal climate adaptation law (adopted in 2023, with implementation starting in 2024), the pressure for municipalities to adapt is rising and with it the demand for materialistic responses that can be showcased. Climate adaptation is still

not a mandatory task for German municipalities, even though the law requires municipalities of a certain size to develop a climate adaptation plan. It will be up to the respective federal state (“Bundesland”) to determine whether smaller municipalities can be exempt from this obligation, provided that a plan already exists at the county level (“Kreis”). More importantly, the law does not specify the (urgently needed) designation of climate adaptation as a mandatory municipal task, including the urgently needed corresponding allocation of financial resources. Yet, because climate adaptation is still not a mandatory task for German municipalities, it will continue to be considered an extra but urgent task, and the new law might even exacerbate regional inequalities.

Data availability. Empirical data are not publicly available since the interviewees’ participation was based on the condition of anonymity.

Author contributions. All authors contributed to the study’s conception and design, wrote different sections of the submitted paper, commented on various versions of the draft, and read and agreed to the submitted version.

Competing interests. The contact author has declared that none of the authors has any competing interests.

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Acknowledgements. The authors would like to thank Klaus Jacob for his dedication to the *GoingVis* project, his contribution of central conceptual ideas, and his support in progress evaluation, as well as data collection. We also wish to express our gratitude to Thorsten Heimann, whose conceptual input at the start of the project was pivotal to its development. Further, we would like to thank Beatrice John, Andreas Claus, and Daniel Willeke for their invaluable time and local insights into municipal processes from a bird's-eye perspective. Warm thanks also go to Dominik Zahrnt for his inviting communication and organisational support in the implementation of some of the local experiments. Additionally, we acknowledge Julia Gerdson and Johannes Tolk for their essential contributions to the later stages of the project, particularly regarding the communication strategy and the implementation of the final projects. Although their involvement was more focused on the evaluation phase, their support was vital to ensuring the continued success and visibility of the *GoingVis* project. Last, but not least, we want to thank Christian Reichelt for supporting the initial phase of data collection.

Financial support. This research has been supported by the Bundesministerium für Bildung und Forschung (grant nos. 01LR82018A and 01LR1709B1).

Review statement. This paper was edited by Marco Pütz and reviewed by two anonymous referees.

References

- Acuto, M. and Ghojeh, M.: C40 Cities Inside Out, *Global Policy*, 10, 709–711, <https://doi.org/10.1111/1758-5899.12760>, 2019.
- Amati, M. and Taylor, L.: From Green Belts to Green Infrastructure, *Planning Practice and Research*, 25, 143–155, <https://doi.org/10.1080/02697451003740122>, 2010.
- Andersson, I.: “Green cities” going greener? Local environmental policy-making and place branding in the “Greenest City in Europe”, *European Planning Studies*, 24, 1197–1215, <https://doi.org/10.1080/09654313.2016.1152233>, 2016.
- Bausch, T. and Koziol, K.: New Policy Approaches for Increasing Response to Climate Change in Small Rural Municipalities, *Sustainability*, 12, 1894, <https://doi.org/10.3390/su12051894>, 2020.
- Beatley, T.: Singapore City, Singapore: City in a Garden, in: *Handbook of Biophilic City Planning and Design*, edited by: Beatley, T., Island Press/Center for Resource Economics, Washington, DC, 51–66, https://doi.org/10.5822/978-1-61091-621-9_5, 2016.
- Bedsworth, L. W. and Hanak, E.: Climate policy at the local level: Insights from California, *Global Environmental Change*, 23, 664–677, <https://doi.org/10.1016/j.gloenvcha.2013.02.004>, 2013.
- Bery, S. and Haddad, M. A.: Walking the Talk: Why Cities Adopt Ambitious Climate Action Plans, *Urban Affairs Review*, 59, 1385–1407, <https://doi.org/10.1177/10780874221098951>, 2023.
- Blaulichtreport Elbe-Elster: Ein Landkreis im Ausnahmezustand – Knapp 330 Einsätze mussten abgearbeitet werden, <https://blaulichtreport-lkee.de/aktuelles/einsaetze/einlandkreis-im-ausnahmezustand-knapp-330-einsaetze-mussten-abgearbeitet-werden/> (last access: 21 November 2025), 2017.
- Bundesministerium für Landwirtschaft, Ernährung und Heimat (BMEL): Waldbrandstatistik, <https://www.bmel-statistik.de/forst-holz/waldbrandstatistik> (last access: 21 November 2025), 2022.
- Buzogány, A. and Scherhauser, P.: Framing different energy futures? Comparing Fridays for Future and Extinction Rebellion in Germany, *Futures*, 137, 102904, <https://doi.org/10.1016/j.futures.2022.102904>, 2022.
- Cidell, J.: Sustainable imaginaries and the green roof on Chicago's City Hall, *Geoforum*, 86, 169–176, <https://doi.org/10.1016/j.geoforum.2017.09.016>, 2017.
- Demazière, C.: “Green city branding or achieving sustainable urban development? Reflections of two winning cities of the European Green Capital Award: Stockholm and Hamburg”, *Town Planning Review*, 91, 373–395, <https://doi.org/10.3828/tpr.2020.22>, 2020.
- Di Paola, L.: Milan's private Vertical Forests vs. horizontal urban greening, in: *The Green City and Social Injustice 21 Tales from North America and Europe*, edited by: Angelovski, I., Routledge, London, <https://doi.org/10.4324/9781003183273>, 2021.
- City Boizenburg/Elbe: Wissenswertes: Klimabüro Boizenburg/Elbe, <https://www.boizenburg.de/stadtleben/umwelt-natur-und-klima/klimabuero-boizenburg/wissenswertes> (last access: 21 November 2025).
- Eckersley, P.: Power and Capacity in Urban Climate Governance, Peter Lang UK, <https://doi.org/10.3726/b11754>, 2018.
- Eckersley, P., Haupt, W., and Kern, K.: Assessing the impact of Fridays for Future on climate policy and policymaking in German cities, *Journal of Environmental Policy and Planning*, 27, 280–293, <https://doi.org/10.1080/1523908X.2025.2466821>, 2025.
- Eckersley, P., Haupt, W., Wiegand, V., Niewind, J., and Otto, A.: Intentionality and visibility in state- and society-led climate approaches: towards a more comprehensive understanding of local adaptation initiatives, *Geogr. Helv.*, 78, 369–380, <https://doi.org/10.5194/gh-78-369-2023>, 2023.
- Fila, D., Fünfgeld, H., and Dahmann, H.: Climate change adaptation with limited resources: adaptive capacity and action in small- and medium-sized municipalities, *Environment, development and sustainability*, 1–21, <https://doi.org/10.1007/s10668-023-02999-3>, 2023.
- Fünfgeld, H., Fila, D., and Dahmann, H.: Upscaling climate change adaptation in small- and medium-sized municipalities: current barriers and future potentials, *Current Opinion in Environmental Sustainability*, 61, 101263, <https://doi.org/10.1016/j.cosust.2023.101263>, 2023.
- Göpfert, C., Wamsler, C., and Lang, W.: A framework for the joint institutionalization of climate change mitigation and adaptation in city administrations, *Mitigation and adaptation strategies for global change*, 24, 1–21, <https://doi.org/10.1007/s11027-018-9789-9>, 2019a.

- Göpfert, C., Wamsler, C., and Lang, W.: Institutionalizing climate change mitigation and adaptation through city advisory committees: Lessons learned and policy futures, *City and Environment Interactions*, 1, 100004, <https://doi.org/10.1016/j.cacint.2019.100004>, 2019b.
- Göpfert, C., Wamsler, C., and Lang, W.: Enhancing structures for joint climate change mitigation and adaptation action in city administrations – Empirical insights and practical implications, *City and Environment Interactions*, 8, 100052, <https://doi.org/10.1016/j.cacint.2020.100052>, 2020.
- Growe, A. and Freytag, T.: Image and implementation of sustainable urban development: Showcase projects and other projects in Freiburg, Heidelberg and Tübingen, Germany, *RuR*, 77, 457–474, <https://doi.org/10.2478/rara-2019-0035>, 2019.
- Jossin, J.: Monitor Nachhaltige Kommune – Bericht 2021: Visionen zur Stadt der Zukunft, Kommunen in der sozial-ökologischen Transformation, Gütersloh, <https://doi.org/10.11586/2021114>, 2021.
- Haupt, W.: How Do Local Policy Makers Learn about Climate Change Adaptation Policies? Examining Study Visits as an Instrument of Policy Learning in the European Union, *Urban Affairs Review*, 57, 1697–1729, <https://doi.org/10.1177/1078087420938443>, 2021.
- Haupt, W. and Kern, K.: Explaining climate policy pathways of unlikely city pioneers: The case of the German city of Remscheid, *Urban Climate*, 45, <https://doi.org/10.1016/j.uclim.2022.101220>, 2022.
- Haupt, W., Chelleri, L., van Herk, S., and Zevenbergen, C.: City-to-city learning within climate city networks: definition, significance, and challenges from a global perspective, *International Journal of Urban Sustainable Development*, 12, 143–59, <https://doi.org/10.1080/19463138.2019.1691007>, 2020.
- Haupt, W., Eckersley, P., Irmisch, J., and Kern, K.: How do local factors shape transformation pathways towards climate-neutral and resilient cities?, *European Planning Studies*, 31, 1903–1925, <https://doi.org/10.1080/09654313.2022.2147394>, 2023.
- Häußler, S. and Haupt, W.: Climate change adaptation networks for small and medium-sized cities, *SN Social Sciences* 1, <https://doi.org/10.1007/s43545-021-00267-7>, 2021.
- Heidrich, O., Dawson, R. J., Reckien, D., and Walsh, C. L.: Assessment of the climate preparedness of 30 urban areas in the UK, *Climatic Change*, 120, 771–784, <https://doi.org/10.1007/s10584-013-0846-9>, 2013.
- Heinelt, H. and Lamping, W.: The development of local knowledge orders: a conceptual framework to explain differences in climate policy at the local level, *Urban Research and Practice*, 8, 283–302, <https://doi.org/10.1080/17535069.2015.1051378>, 2015.
- Hölscher, K., Frantzeskaki, N., McPhearson, T., and Loorbach, D.: Tales of transforming cities: Transformative climate governance capacities in New York City, U.S. and Rotterdam, Netherlands, *Journal of environmental management*, 231, 843–857, <https://doi.org/10.1016/j.jenvman.2018.10.043>, 2019.
- Homsy, G. C.: Unlikely pioneers: creative climate change policy-making in smaller U.S. cities, *J. Environ. Stud. Sci.*, 8, 121–131, <https://doi.org/10.1007/s13412-018-0483-8>, 2018.
- Hoppe, T., van der Vegt, A., and Stegmaier, P.: Presenting a Framework to Analyze Local Climate Policy and Action in Small and Medium-Sized Cities, *Sustainability*, 8, 847, <https://doi.org/10.3390/su8090847>, 2016.
- Irmisch, J., Haupt, W., Eckersley, P., Müller, H., and Kern, K.: Klimapolitische Entwicklungspfade deutscher Groß- und Mittelstädte, *Erkner*, ISSN 2701-228X, 2022.
- Jönsson, E. and Holgersen, S.: Spectacular, realisable and ‘everyday’, *City*, 21, 253–270, <https://doi.org/10.1080/13604813.2017.1325186>, 2017.
- Keeler, L. W., Beaudoin, F., Wiek, A., John, B., Lerner, A. M., Beecroft, R., Tamm, K., Seebacher, A., Lang, D. J., Kay, B., and Forrest, N.: Building actor-centric transformative capacity through city-university partnerships, *Ambio*, 48, 529–538, <https://doi.org/10.1007/s13280-018-1117-9>, 2019.
- Kemen, J., Schäffer-Gemein, S., and Kistemann, T.: Klimaanpassung und Hitzeaktionspläne: Ein idealtypisches Thema der geografischen Gesundheitsforschung, *Informationen zur Raumentwicklung*, 58–69, <https://biblioscout.net/content/99.140005/izr202001005801.pdf> (last access: 21 November 2025), 2020.
- Kern, K.: Cities as leaders in EU multilevel climate governance: embedded upscaling of local experiments in Europe, *Environmental Politics*, 28, 125–145, <https://doi.org/10.1080/09644016.2019.1521979>, 2019.
- Kern, K. and Bulkeley, H.: Cities, Europeanization and Multi-level Governance: Governing Climate Change through Transnational Municipal Networks, *J. Common Market Studies*, 47, 309–332, <https://doi.org/10.1111/j.1468-5965.2009.00806.x>, 2009.
- Krause, R. M.: An assessment of the greenhouse gas reducing activities being implemented in US cities, *Local Environment*, 16, 193–211, <https://doi.org/10.1080/13549839.2011.562491>, 2011.
- Mahlkow, N. and Donner, J.: From Planning to Implementation? The Role of Climate Change Adaptation Plans to Tackle Heat Stress: A Case Study of Berlin, Germany, *Journal of Planning Education and Research*, 37, <https://doi.org/10.1177/0739456X16664787>, 2017.
- Maskell, G., Shukla, R., Jagannathan, K., Browne, K., Ulibarri, N., Campbell, D., Franz, C., Grady, C., Joe, E. T., Kirchhoff, C., Madhavan, M., Michaud, L., Sharma, S., Singh, C., Orlove, B., Nagle Alverio, G., Ajibade, I., Bowen, K., Chauhan, N., Galapaththi, E., Hudson, A. J., Mach, K., Musah-Surugu, J., Petzold, J., Reckien, D., Schauburger, B., Segnon, A., van Bavel, B., and Gornott, C.: Dichotomy or continuum? A global review of the interaction between autonomous and planned adaptations, *E&S*, 30, <https://doi.org/10.5751/ES-15335-300118>, 2025.
- Mewes, L., Tuitjer, L., and Dirksmeier, P.: Exploring the variances of climate change opinions in Germany at a fine-grained local scale, *Nature communications*, 15, 1867, <https://doi.org/10.1038/s41467-024-45930-8>, 2024.
- McCann, E.: Urban Policy Mobilities and Global Circuits of Knowledge: Toward a Research Agenda, *Annals of the Association of American Geographers*, 101, 107–130, <https://doi.org/10.1080/00045608.2010.520219>, 2011.
- Mitchell, N., Herdtle, C., and Jacob, K.: Examining the dynamics of social cohesion: A call for a different perspective on scaling impacts of real-world laboratories, *GAIA*, 33, 51–56, <https://doi.org/10.14512/gaia.33.S1.8>, 2024.
- Mitchell, N., John, B., and Jacob, K.: Zukunftsfähige Kleinstadt durch kollaborative Klimaanpassung?: Die intermediären Governance-Plattformen in Boizenburg/Elbe und der Verbandsgemeinde Liebenwerda, in: *Kleinstadtforschung*, edited by: Gribat, N., Ülker, B., Weidner, S.,

- Weyrauch, B., and Ribbeck-Lampel, J., Transcript, Bielefeld, <https://doi.org/10.1515/9783839465080>, 2022.
- Milbert, A. and Porsche, L.: Kleinstädte in Deutschland, Bonn, ISBN 978-3-88838-425-7, 2021.
- Ministerium für Landwirtschaft, Umwelt und Klimaschutz (MLEUV): Waldbrandstatistik 2022, Potsdam, <https://forst.brandenburg.de/sixcms/media.php/9/Waldbrandstatistik2022.pdf> (last access: 21 November 2025), 2023.
- Montero, S.: Study tours and inter-city policy learning: Mobilizing Bogotá's transportation policies in Guadalajara, *Environ. Plan. A*, 49, 332–350, <https://doi.org/10.1177/0308518X16669353>, 2017.
- Nagorny-Koring, N.: Kommunen im Klimawandel: Best Practices als Chance zur grünen Transformation?, transcript, Bielefeld, ISBN 978-3-8376-4627-6, 2018.
- NDRMV: Hitzetag: Boizenburg ist Spitzenreiter mit 37,7 Grad, <https://www.ndr.de/nachrichten/mecklenburg-vorpommern/wetterumschwung-auf-die-hitze-folgen-regen-und-sturmboeen, hitze-292.html;%202> (last access: 21 November 2025), 2025.
- NDR Nordmagazin: Boizenburg: Deiche leiden unter anhaltender Trockenheit, <https://www.ardmediathek.de/video/nordmagazin/boizenburg-deiche-leiden-unter-anhaltender-trockenheit/ndr/Y3JpZDovL25kci5kZS80M2VkYTM2NC03NDM4LTQyZGltYjA4Mi0yY2RiNDRjNTNhMjc> (last access: 21 November 2025), 2025.
- Otto, A., Göpfert, C., and Thieken, A. H.: Are cities prepared for climate change? An analysis of adaptation readiness in 104 German cities, *Mitig. Adapt. Strateg. Glob. Change*, 26, <https://doi.org/10.1007/s11027-021-09971-4>, 2021a.
- Otto, A., Kern, K., Haupt, W., Eckersley, P., and Thieken, A. H.: Ranking local climate policy: assessing the mitigation and adaptation activities of 104 German cities, *Climatic Change*, 167, <https://doi.org/10.1007/s10584-021-03142-9>, 2021b.
- Peck, J. and Theodore, N.: Follow the Policy: A Distended Case Approach, *Environ. Plan. A*, 44, 21–30, <https://doi.org/10.1068/a44179>, 2012.
- Pfeifer, S., Bathiany, S., and Rechid, D.: Klimaausblick Landkreis Ludwigslust-Parchim, https://www.gerics.de/products_and_publications/fact_sheets/landkreise/ (last access: 21 November 2025), 2021.
- Porsche, L., Steinführer, A., and Sondermann, M.: Kleinstadtforschung in Deutschland, Stand, Perspektiven und Empfehlungen, Hannover, Arbeitsberichte der ARL, 28, ISBN 978-3-88838-425-7, 2019.
- Prina, M., Khan, N., Akhter Khan, S., Castro Caicedo, J., Peycheva, A., Seo, V., Xue, S., Sadana, R.: Climate change and healthy ageing: An assessment of the impact of climate hazards on older people, *J. Glob. Health*, 14, 04101, <https://doi.org/10.7189/jogh.14.04101>, 2024.
- Renn, O.: Real-World Laboratories – the Road to Transdisciplinary Research?, *GAIA*, 27, 1, <https://doi.org/10.14512/gaia.27.S1.1>, 2018.
- Sancino, A., Stafford, M., Braga, A., and Budd, L.: What can city leaders do for climate change? Insights from the C40 Cities Climate Leadership Group network, *Regional Studies*, 56, 1224–1233, <https://doi.org/10.1080/00343404.2021.2005244>, 2021.
- Schäfer, S., Zorn, A., Fünfgeld, H., and Fila, D.: Socio-theoretical perspectives on climate change adaptation – theorizing the politics, governance, and planning of climate change impacts and responses, theme issue, *Geographica Helvetica*, https://gh.copernicus.org/articles/special_issue1206.html (last access: 25 November 2025), 2024.
- Schanze, J., Korzhenevych, A., Bartel, S., Kind, C., and Sarti-son, K.: Handlungsansätze kleinerer und/oder finanzschwacher Kommunen zur Anpassung an den Klimawandel und den gesellschaftlichen Wandel, Dessau-Roßlau, Umweltforschungsplan des Bundesministeriums für Umwelt, Naturschutz und nukleare Sicherheit, 1, ISSN 1862-4804, 2021.
- Schäpke, N., Bergmann, M., Stelzer, F., Lang, D. J., and Editors, G.: Labs in the Real World: Advancing Transdisciplinary Research and Sustainability Transformation: Mapping the Field and Emerging Lines of Inquiry, *GAIA*, 27, 8–11, <https://doi.org/10.14512/gaia.27.S1.4>, 2018.
- Schüle, R., Fekkak, M., Lucas, R., and Winterfeld, U. von: Kommunen befähigen, die Herausforderungen der Anpassung an den Klimawandel systematisch anzugehen (KoBe), Dessau-Roßlau, *Climate Change*, 20, ISSN 1862-4359, 2016.
- Spaans, M. and Waterhout, B.: Building up resilience in cities worldwide – Rotterdam as participant in the 100 Resilient Cities Programme, *Cities*, 61, 109–116, <https://doi.org/10.1016/j.cities.2016.05.011>, 2017.
- Steinführer, A., Porsche, L., and Sondermann, M.: Kompendium Kleinstadtforschung, Forschungsberichte der ARL, No. 16, Verlag der ARL – Akademie für Raumentwicklung in der Leibniz-Gemeinschaft, Hannover, ISBN 978-3-88838-103-4, 2021.
- Teebken, J.: Vulnerability locked in. On the need to engage the outside of the adaptation box, *Global Environmental Change*, 85, <https://doi.org/10.1016/j.gloenvcha.2024.102807>, 2024.
- Tobin, P.: Leaders and Laggards: Climate Policy Ambition in Developed States, *Global Environmental Politics*, 17, 28–47, https://doi.org/10.1162/GLEP_a_00433, 2017.
- Wamsler, C.: Mainstreaming ecosystem-based adaptation: transformation toward sustainability in urban governance and planning, *E&S*, 20, <https://doi.org/10.5751/ES-07489-200230>, 2015.
- WBGU - Wissenschaftlicher Beirat des Bundesregierung Globale Umweltveränderungen: Der Umzug der Menschheit: die transformative Kraft der Städte, Berlin, 2016.
- Wegweiser Kommune: Boizenburg / Elbe (im Landkreis Ludwigslust-Parchim), <https://www.wegweiser-kommune.de/kommunen/boizenburg-elbe> (last access: 21 November 2025), 2021a.
- Wegweiser Kommune: Uebigau-Wahrenbrück (im Landkreis Elbe-Elster), <https://www.wegweiser-kommune.de/kommunen/uebigau-wahrenbrueck> (last access: 21 November 2025), 2021b.
- Wurzel, R. K., Lieferrink, D., and Torney, D.: Pioneers, leaders and followers in multilevel and polycentric climate governance, *Environmental Politics*, 28, 1–21, <https://doi.org/10.1080/09644016.2019.1522033>, 2019a.
- Wurzel, R. K., Moulton, J. F., Osthurst, W., Mederake, L., Deutz, P., and Jonas, A. E.: Climate pioneer-ship and leadership in structurally disadvantaged maritime port cities, *Environmental Politics*, 28, 146–166, <https://doi.org/10.1080/09644016.2019.1522039>, 2019b.
- Zahran, S., Brody, S. D., Vedlitz, A., Grover, H., and Miller, C.: Vulnerability and Capacity: Explaining Local Commitment to Climate-Change Policy, *Environ. Plann. C Gov. Policy*, 26, 544–562, <https://doi.org/10.1068/c2g>, 2008.

Zölch, T., Wamsler, C., and Pauleit, S.: Integrating the ecosystem-based approach into municipal climate adaptation strategies: The case of Germany, *Journal of Cleaner Production*, 170, 966–977, <https://doi.org/10.1016/j.jclepro.2017.09.146>, 2018.